# SCIENTIFIC AMERICAN

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1. Reproducing gramophone. 2. Recording instrument. 3. Record disks. 4. Recording cornet solo. 5. Reproducing sound box. 6. Cross section of sound box. 7. Sound box in position for use. 8. Details of mechanism. 9. Part of a record. 10 and 11. Motor driven gramophone.

**THE GRAMOPHONE—THE NEW TALKING MACHINE.**—[See page 311.]

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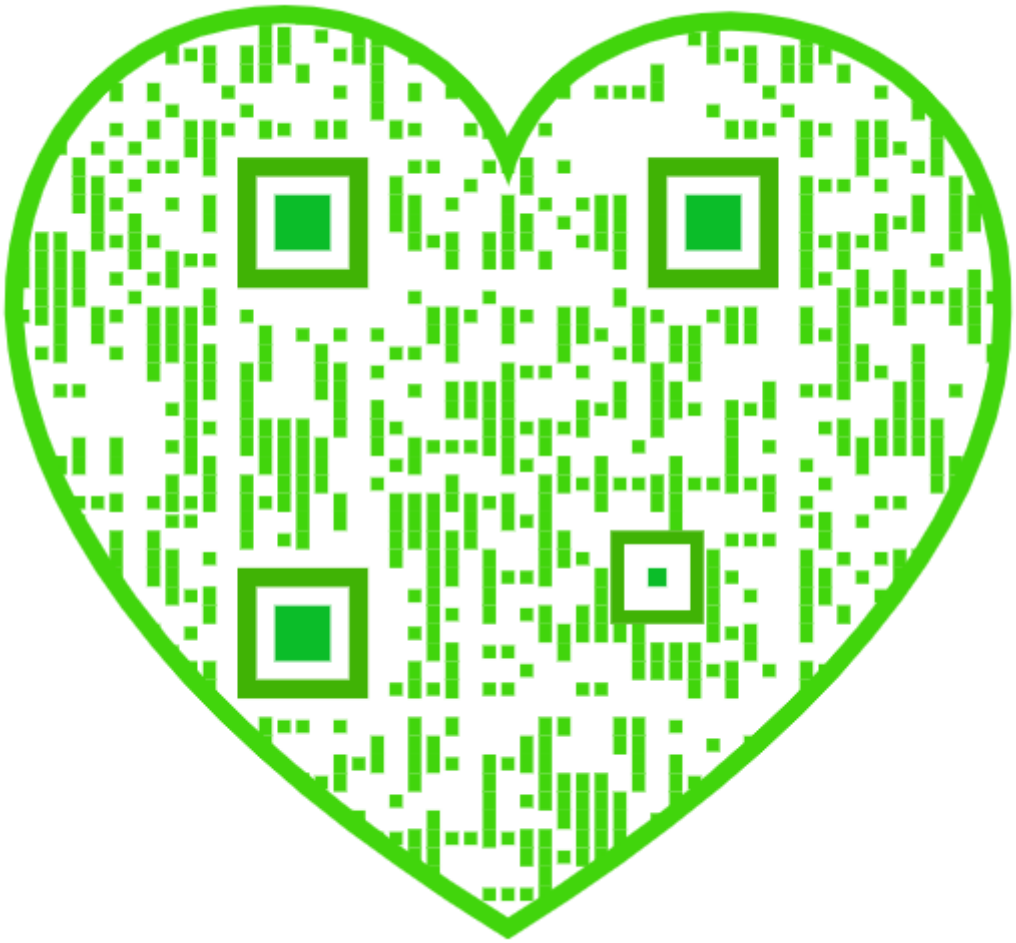

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## THE NATIONAL ELECTRICAL EXPOSITION.

The managers of the National Electrical Exposition, of which we give a detailed notice on another page, have every reason to be gratified at the success which marked the formal opening at the Grand Central Palace, New York, on Monday, May 4. It speaks well for the future extended use of electrical appliances among the people at large, and for the increasing popular interest in matters of purely scientific and technical interest, that for half an hour previous to the opening hour the street was filled with an expectant crowd, and that the interior of the spacious hall was closely packed with an enthusiastic audience. This is not the first occasion during this season on which industrial and artistic exhibitions have been crowded, while the various local theaters and amusement halls have been complaining of the paucity of their attendance. Without in any sense decrying the value and necessity for the latter institutions, we cannot but express our gratification at this growing popular interest in the various arts and sciences, to the awakening and sustaining of which interest we have endeavored to do our share during the past half century.

After a careful inspection of the exhibit it is difficult to realize that all this practical development of the electrical art has been the work of a single generation; yet if we turn from the modern to the historical section, it is at once evident that the date of the birth of the practical age of electricity falls easily within the last twenty to thirty years. While it is true that some of the simplest properties of electricity were dimly perceived by the ancients, and its history dated from the remote past, it was not until the seventies of the present century that electric light and power demonstrated to the public satisfaction their practical commercial value. The very excellent historical exhibit lends a special interest to the exposition as showing this later development in concrete form; and the principle crudely embodied in the models in the Patent Office exhibit may be seen expressed in a perfect mechanical form in the varied display of modern industrial and domestic appliances.

## RAPID TRANSIT IN NEW YORK CITY.

In a recent issue we drew attention to the fact that the rapidly increasing traffic on the New York surface and elevated roads demanded a more immediate relief than could possibly be afforded by the proposed Broadway tunnel, and suggested that the speediest way out of the difficulty would be to extend the existing elevated roads and enlarge their capacity. The Rapid Transit Commission have claimed that though they have been open to suggestions from the elevated roads, looking to an extension of the system, no proposition has as yet been laid before them.

We are glad to notice, however, that Mr. Gould and Mr. Sage, in an interview with Mayor Strong, on May 4, submitted a proposition for an extension of the elevated roads and a considerable increase in their present capacity. The proposed new lines consist of an extension of the Ninth and Sixth Avenue lines from the present uptown terminus to the west side city limits. It also provides for crosstown connection by way of Canal and Center Streets with the terminal station of the Third Avenue line, at City Hall Park.

The proposed west side extension will, of course, be very welcome to the residents who will be served by it, and it will do much to build up the district through which it passes. A proposal, however, which is of greater importance, and will benefit a far larger portion of the traveling public, is that to lay a third track on all the existing lines upon which there are but two tracks at present, and upon all the extensions, and to run express trains over the whole system. It is the intention of the Mayor to submit the proposition to the Rapid Transit Commission; and as there is no necessary antagonism between it and the proposed tunnel, it is to be hoped that they will give it their full indorsement.

Even if the proposal of the elevated roads be immediately carried out, it is likely that there will be a strong demand for the tunnel line by the time, or soon after, it is completed. In the lower part of the city it will serve a district which lies midway between the Third and Sixth Avenue lines, and it will help to accommodate a traffic which has already overtaken the capacity of the existing surface roads.

The pressing need, however, is a scheme which will give speedy relief, and the proposal now before Mayor Strong is the only one in sight which promises to do this.

## THE PATENT COMMISSIONER'S REPORT FOR 1895.

The Patent Commissioner's Annual Report is a document which has a special interest in a country like our own, which owes its wealth and power so largely to the genius and patience of the inventor and to the recognition and protection which are afforded him by our admirable system of patent laws.

The report for 1895 shows that there were 39,145 applications for patents in 1895, and 21,998 granted. There was a surplus of receipts over expenditures of $160,750, bringing the total balance to the credit of the Patent Office in the United States Treasury up to $4,529,886. In every year since 1861 there has been a surplus over all expenditures.

In proportion to population, more patents were issued to citizens of Connecticut than to those of any other State—one to every 927 inhabitants. Then follow the District of Columbia, with one to every 1,047; Massachusetts, one to 1,248; Rhode Island, one to 1,528; New York, one to 1,694; Colorado has one to every 1,917. The fewest patents in proportion to population were granted in the South, where Mississippi has one to every 34,854 inhabitants; North Carolina, one to every 24,891; and Georgia, one to every 16,117. Of the patents issued, 2,049 were granted to citizens of foreign countries, and of these, 614 were to residents of England, being a larger number than to residents of any other foreign country.

As the result of an effort made through the various diplomatic representatives of the United States residing abroad, the library now possesses a record of 981,961 patents issued by foreign countries. A comparison with the United States shows that, prior to 1870, the total number of patents granted by the United States was 108,416 and by foreign countries 222,615. The total number granted up to date is for the United States, 562,458, and for foreign countries, 981,961, making a grand total for the world, from the earliest records up to 1895, of 1,544,419.

The following is an alphabetical list of twenty-five inventors to each of whom the Patent Office has granted more than 100 patents, the whole number granted to these inventors being 4,894: Edward J. Brooks, 116; George D. Burton, 128; Luther C. Crowell, 147; Peter C. Dederick, 107; Thomas A. Edison, 711; Rudolf Eickemeyer, 158; Louis Goddu, 131; Rudolph M. Hunter, 228; John W. Hyatt, 198; Hiram S. Maxim, 131; Arthur J. Moxham, 144; Lewis Hallock Nash, 119; Edwin Norton, 125; Feeborn F. Raymond, 2d, 144; George H. Reynolds, 101; Francis H. Richards, 343; Cyrus W. Saladee, 148; Walter Scott, 109; Charles E. Scribner, 248; Sydney H. Short, 111; Elihu Thomson, 394; Charles J. Van Depoele, 244; George Westinghouse, Jr., 217; Edward Weston, 274; William N. Whiteley, 118.

In the whole of the report there is no question of more vital importance to the inventor than that of the enactment of rules and regulations concerning the admission to a solicitors' bar of those entitled to practice before the Patent Office.

The commissioner strongly recommends that such a bar be established. As the matter now stands, there is practically no guarantee required either of the character or capacity of a practitioner. "Any one who has not been proved before the Patent Office to have retained the money of his client, or to have been guilty of other gross misconduct, is permitted to practice before the office," and it is a fact that there are to be found unscrupulous and unqualified men who do not hesitate to go before the office having in charge cases for the conduct of which they are utterly unqualified. The report states that, "it not infrequently happens that a practitioner . . . . instead of bestowing the requisite labor and care" upon a meritorious invention, most of the claims for which have been poorly drawn up, and have been rejected by the office, "promptly directs the cancelation of all claims objected to, and thus puts the application into condition for allowance with an inadequate claim." Appeals are also taken upon a case "for no assignable reason other than to secure from some unlettered client the appeal fee." Another class is spoken of as "lying in wait" for those who come to present their inventions in person. They are to be found around the Patent Office elevator, "and they have no other place of business than the attorneys' room in the Patent Office."

It is high time, both in the interests of the reputable attorney and his client, that such a patent bar as the commissioner suggests was established; and this strong denunciation of so-called patent attorneys and bogus firms, whose sole object is plunder, is very timely. They not only rob the "unlettered client," but they cast a shadow upon the reputable practitioner, and bring discredit upon the Patent Office itself—and this just at the very time when the hands of that institution need to be strengthened.

The report makes favorable reference to the bill prepared by the patent committee of the American Bar Association, and now before the House of Representatives, which we discussed editorially in our issue of April 18.

The attention of Congress is called to the pressing need of the Patent Office for enlarged accommodation. It seems that a large part of the building, which was originally intended for the exclusive use of the Patent Office, has been appropriated to the use of other governmental departments. The result is that "the force of the Patent Office is scattered in remote parts of the building; its valuable records are disposed upon all the floors and are at all times exposed to the danger of conflagrations and other loss;" and there are other disabilities which render the passage of Senate bill 429, for the construction of a building for the use of the Patent Office, an imperative necessity. Failing this,

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the very least that should be done is to reserve the present building for the exclusive use of this department.

We heartily indorse the suggestion that an exhibition hall for models should be established in which the valuable collection of models already in possession of the office could be permanently housed and open to public inspection. Our readers will agree with the commissioner that it was "a public calamity when the office was compelled to suspend receiving models for want of space in which to exhibit them." The success of the exhibit of Patent Office models at the Chicago and Atlanta expositions and the very instructive historical exhibit now to be seen at the Electrical Exposition at New York, indicates how instructive and historically interesting such a national hall of models would be. It would be a concrete history of our national progress in the industrial arts.

The report finally draws attention to the need for a more thorough system of classification of the accumulated records of the world relating to the granting of patents or the description of inventions. The necessity for complete and readily accessible records will be understood when it is remembered that "while all patents are prima facie valid, no patent will be finally sustained by the courts which purports to secure to the grantee the exclusive use of an improvement which has been before patented in this or in any foreign country, or which has been described in any printed publication in any language before the invention thereof by the patentee." The matter at the Patent Office has been classified "with great care, and yet not with that full perfection" which is indispensable. This "full perfection" can only be secured by a "separate division of experienced examiners, devoted exclusively to the work of classification." The commissioner is of the opinion that the work could be so exhaustively carried out by such a division that no patent could be issued without an inspection of all that is in print pertaining to the same art. The work could be completed in five years at a cost of $64,500.

We think that the sum named is reasonable in view of the great value of the result. A perfect classification of the above records is absolutely necessary to the protection of the inventor. In granting a patent the Patent Office should be in a position to know with certainty that there could be no possible subsequent loss to the inventor on the ground of previous publication.

The commissioner closes the report with an extremely valuable categorical review of the growth of industrial arts during the past twenty-five years. The object and the execution of this work are alike admirable. It reflects the greatest credit upon the Patent Office, and is a clear evidence of the earnest sincerity with which it has always endeavored to safeguard the interests of the inventor.

The commissioner's report is published in the current issue of the SUPPLEMENT.

### The New Columbia.

The spacious and charming site of Columbia University, New York City, was dedicated on May 2, with impressive ceremonies, in the presence of many thousand visitors. In the morning the exercises attending the laying of the cornerstones of the Physics building and Schermerhorn Hall were of a semi-private nature, the real celebration taking place in the afternoon. The morning ceremonies took place amid workmen's sheds and piles of cement, derricks and heaps of granite blocks, but the friends of Columbia could picture to themselves the imposing group of buildings which are so soon to rise on Morningside Heights. The procession included the members of the faculty, officers of the college, trustees, architects and speakers. Dr. Marvin R. Vincent acted as chaplain and Prof. Ogden N. Rood applied the mortar to the foundations and the heavy cornerstone of the Physics building was lowered into place. J. Howard Van Amringe, Dean of the College, delivered an address. Dr. Dix acted as chaplain when the foundation of Schermerhorn Hall was reached. The cornerstone was then laid by Mr. Wm. C. Schermerhorn, the donor of the building and chairman of the board of trustees. Dr. Henry Fairfield Osborn delivered the address. The procession then reformed, and the next two hours was spent at luncheon and enjoying an informal reunion. Luncheon was served in a big tent near the partially completed library.

At two o'clock the procession began to form for the afternoon exercises. The procession was made up in the main as in the morning, and included the clergy, professors and tutors, officers of the college, undergraduates, alumni, guests and speakers. While the professors and students in their caps and gowns were assembling in the college grounds, the Seventy-first Regiment was marching up Amsterdam Avenue escorting Lafayette Post, G. A. R. The band struck up "Hail to the Chief," and a mighty cheer went up as soon as Governor Morton arrived in his carriage. In the meantime the procession was passing into the great tent which had been erected in the south court. It was soon filled with the undergraduates and the undergraduates of Barnard College, the members of the faculty and the invited guests. The exercises were begun by a prayer by the Rev. Edward J. Coe. He was followed by Seth Low, the President of the University, who made an eloquent address. Members of Lafayette Post and their escort then came forward to perform the ceremony for which they had assembled. Adjutant Wilbur F. Brown presented the national flag, with a flagstaff and pedestal of granite and bronze, with fitting remarks. The colors were then accepted by President Low. When this ceremony was ended the dedication ode, written in Latin for this occasion by Prof. H. T. Peck, was sung by the student body under the leadership of the glee club, then came the speech of the day, which was delivered by the Hon. Abram S. Hewitt. When Mr. Hewitt had finished, Dr. Charles W. Eliot, the President of Harvard University, delivered an address. By this time darkness was beginning to steal over the heights, and the audience was dismissed after the benediction, which was pronounced by Bishop Potter.

It has been often said that the citizens of New York were not proud enough of Columbia, manifesting too slight a concern for its growth and contributing too little to its material support, but this is true no longer. It is to-day a university in the true sense of the word and a change of place was essential to its upgrowth, and the officers of the university have been wise and fortunate in choosing a site which will at the same time give it seclusion and which is well adapted for the pursuit of scholastic studies.

### Obituary.

FRANK HENRY.

Frank Henry, inventor of the feller (foot hemmer) and many other devices in connection with sewing machine attachments, died at his home, 5520 Main Street, Germantown, Philadelphia, Monday, April 6, 1896, of pneumonia.

Mr. Henry was of Scotch Puritan ancestry, and was born at Norwich, Conn., in 1821. He was the only son of David Henry, M.D.

About 1840 he came to Philadelphia and graduated in pharmacy. He then began the study of medicine at the University of Pennsylvania, but before completing his course, he became interested in the manufacture of artificial limbs. This diversion from his original bent inclined his mind toward mechanical devices, and changed his career. In 1853 his penchant for experimenting with sewing machines began, which business was then in its infancy.

Among those of his colleagues interested in his work were the late Mr. Charles Lennig, the well known chemical manufacturer; the late Dr. D. Eldredge Rice, of the Elliptic Sewing Machine Company; Mr. Cheney and Mr. G. B. Sloat, of Philadelphia; the late Mr. Wheeler, of the Wheeler & Wilson Manufacturing Company, of Bridgeport, Conn.; Mr. E. H. Craige, of the Domestic Sewing Machine Company, of New York, and Mr. H. C. Goodrich, attachment manufacturer, of Chicago, Ill. Mr. Henry's name was seldom seen in connection with his many inventions, he preferring others to carry out his ideas; but his name was familiar from its long and intimate association in the minds of the older sewing machine fraternity. From 1853 until 1866 he was connected with the Wheeler & Wilson Manufacturing Company. The first intricate sewing machine stitching exhibited at the Chestnut Street office, Philadelphia, was done by his skillful hands.

Among other devices he invented in 1856 the spiral scroll hemmer and feller combined; in 1857 the Wheeler & Wilson presser arm tucker; in 1860, the star cluster hemmer; in 1867, the foot corder patent, etc. Of the many inventions of the past, few have ever proved more useful to the public or more profitable to the maker than the little device known as the "feller" for felling seams on a sewing machine. This was probably the most valuable of Mr. Henry's inventions, and is now in general use on all sewing machines.

In 1870 Mr. Henry became associated with Mr. Goodrich in the manufacture and improvement of their many inventions at Chicago, Ill., until 1890, when he retired. While Mr. Henry's inventions were chiefly connected with sewing machine works, he invented and patented many other novelties and household articles, among them, in 1875, the hand hem folder; in 1880, the Monitar jar, etc.

### A New Horseless Carriage Race.

The Rhode Island State Fair Association announces that $5,000 will be given in prizes in a series of horseless carriage races to be held during its annual exposition week at Narragansett Park, Providence, R. I., in September. Racing of this kind has been attempted before, but never on so large a scale. The series of races will be held on a regulation trotting track, and the results promise to be interesting. One of the exhibition buildings will be set apart for a horseless carriage exposition. Certainly no "infant industry" was ever so coddled and fostered by the offer of large rewards; up to the present time the results in this country have not been worth the cost.

### Science Notes.

The Fort Pitt Street Railway Company, of Pittsburg, has given $100,000 for a zoological garden at Highland Park.

According to Prof. Bodio, of 8,254 communities in Italy, 1,454 have no supply of pure water, and 4,877 no regular sewage system.

At Calcutta University 2,743 students are matriculated, more than five times as many as in 1865. There are ninety-nine Indian colleges affiliated with the university, which receives no public money in any shape.

Prof. Wortoff, of Moscow, who held the chair of bacteriology at that university, has died of blood poisoning caused by a wound in the neck, inflicted upon him by the explosion of a flask containing a bacterial culture.

It has been decided to honor Pasteur in the district where his first experiments in vaccinating sheep stricken with anthrax were carried out. These experiments were made at Pouilly-le-Fort, in 1881. The statue is to be erected at Melun, near Fontainebleau.

Dr. Wm. H. Wahl, for many years resident secretary of the Franklin Institute, has been honored by the French government by election as "Officier d'Académie," with the decoration of the "palmes academiques," in recognition of his labors as secretary of the Franklin Institute.

Prof. Raoult, of Grenoble, has received the biennial prize of $4,000 from the Academy of Sciences for his discovery of the numerical ratio between the molecular weight of a substance and the difference produced on the freezing point of the liquid that dissolves it by its addition thereto, as well as on the expansion of the vapors in the liquid.

The carbon dioxide in the atmosphere of Edinburgh has been determined daily for the last three years by Dr. C. H. Stewart, of the Public Health Laboratory of that city. In 1893, the proportion 3·96 in 10,000; in 1894, 3·72; in 1895, 3 45. It should be remembered that comparatively little carbon dioxide is yielded by clay soil like that of Edinburgh.

In French surgery, hypodermic injections of artificial serum are used to combat the weakness following operations, says the Medical Record. The serum used is known as "Hayem's," and consists of sodium chloride, 5 grammes; sodium sulphate, 12 grammes; distilled water, 1 liter. This fluid is sterilized by being brought to the boiling point.

Oxalate of lime is found in the bark of trees. The strange discovery has recently been made by Dr. Kraus, in Germany, showing that there is a steady loss of these crystals during the winter season. Just after spring growth had commenced a currant (Ribes sanguineum) had lost 16 per cent, the common dog rose 28 per cent, and the common apple 50 per cent. Just what part this change of proportion plays in the economy of plant life is unknown.

Drs. Gebhard, Fraenkel, and Grawitz have shown, says Modern Medicine, that there is a notable increase in the proportion of the number of corpuscles in the blood in persons who go from a low to a high altitude. This increase takes place in from twenty-four to thirty-six hours. It is possible that this fact may be one of the reasons for the beneficial effects of high altitude in cases of pulmonary tuberculosis. The increase in the red corpuscles is attributed to the desiccating effects of a high atmosphere.

The use of oxygen in combination with chloroform in anæsthesia originated, according to the British Medical Journal, with Neudorfer, and was in vogue in Vienna about ten years ago. Bertel, in a communication to the St. Petersburg Medical Society, asserted that more rapid and successful anæsthesia followed its use. A number of other Russian surgeons have employed it. According to the Medical Press, sixty-one deaths have occurred during the administration of anæsthetics in the United Kingdom in the past year. Fifty-two of these have been due to chloroform.

Since it has become known that milk in a bucket standing in a sick room will absorb germs, a recent writer (Medical Press and Circular) has applied the idea in the treatment of smallpox, fevers, diphtheria, etc., with marked success. The patient is laid on a mattress covered with blankets. He is then packed in a sheet saturated with milk, covering the entire body, in which condition he remains an hour. A warm water bath is then given, after which the surface is dried and the patient is put to bed.

Dr. Deninger, of Dresden, says the Practical Engineer, is reported to have prepared carbon monosulphide pure for the first time, and finds that, instead of being, as described in the text books, an amorphous red solid, it is really a colorless gas. He prepared it by heating dry sodium sulphide with chloroform, or preferably iodoform, in sealed tubes, to 180° C., the gaseous products being made to bubble through aqueous caustic potash, which absorbed the sulphureted hydrogen, and the carbon monosulphide passed through unabsorbed. By acting upon carbon disulphide with sodium, in the presence of some aniline, the new gas was also obtained. It is colorless, and easily condensable to a clear liquid, which evaporates rapidly and is extremely explosive.

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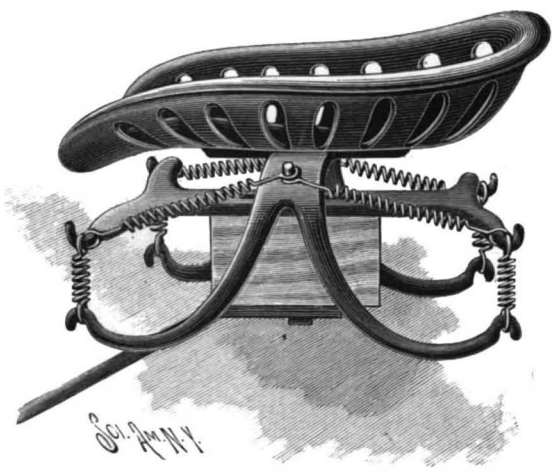
### AN IMPROVED SPRING SEAT.

The illustration represents a seat of novel and inexpensive construction adapted for use on agricultural machines, locomotives, etc. It has been patented by Charles F. Davy, of Starkville, N. Y. The improved seat is attached to a seat standard by a bolt, and consists practically of two sections, a lower frame section having oppositely diverging arms at opposite ends and an upper frame section also having oppositely diverging arms at opposite ends. The arms of the upper section depend below the arms of the lower section, springs uniting the arms of the respective sections, while side springs connected at one end near the center of one section connect diagonally with their opposite ends with arms of the other section, to prevent undue



DAVY'S SPRING SEAT.

rocking movement of the seat and hold it moderately steady. The seat, while capable of moving in all directions, is held in position by the springs, and made comfortable at all times,

### Photographic Prints on Plain Paper.

BY THOMAS EARP.

I find that Rives No. 24 plain paper is all that can be desired for moderate sized prints. Whatman's rough drawing and Michallet's crayon paper are excellent for large work, the latter giving very fine prints of a red color without any toning.

It is necessary to point out that few English papers are of any use, and that attempts to employ them will lead to disappointment. Care must further be taken to sensitize the right side of the paper; an inspection of the water mark will suffice to show this, in the case of Rives paper, and in the rough papers the difference of surface will be a sufficient guide. It is best to mark in pencil the wrong side before preparation.

When salting the paper, the sheets should be immersed one at a time to the number of six, each sheet being turned, and the surfaces freed from air bubbles before another sheet is placed in the bath, then they should be turned over in a body and removed singly, being drawn between the edge of the dish and a glass rod resting against it in order to remove superfluous solution from both surfaces. The sheets when thoroughly dry should be kept flat in a portfolio, so as to avoid difficulty in floating on the sensitizing bath.

Thick, rough papers require longer immersion, etc., in all stages. Sensitizing should be performed as short a time as is possible before the paper is required for use; the dish used only for this purpose having at least a quarter or three-eighths of an inch depth of solution, so as to minimize the risk of air bubbles.

In preparing to float the paper on the sensitizing bath, the sheet should be held by opposite ends or corners, with the wrong side uppermost, and bent so as to cause the lower side to curve with its center downward. The center of this curve should be brought gently into contact with the solution in the dish, and the ends gradually lowered until the sheet lies flat on the bath, any air bubbles which may be observed on raising the paper for inspection being removed with the edge of a small piece of blotting paper.

When the paper is very dry it will be found to curl up on being floated on the solution, and it is well to have two pieces of lath, a little less in length than the paper is wide, and to lay these gently on the back of the floating paper to keep it flat. A pair of ebonite tweezers are useful for lifting the sensitized paper, from which any surplus solution may be removed by drawing it over the edge of the sensitizing dish, and the use of them will obviate finger staining with the silver solution, and marks on the paper from being touched by the fingers. Float for two minutes.

The paper should be dried quickly, and if not used within a few hours, should be stored in a chloride of calcium tube, which may be efficiently improvised with one of the self-closing tins now commonly in use, a small earthen jar containing the calcium chloride being placed within it.

When printing in damp weather a dampproof pad is desirable; no doubt a celluloid film which I have seen recommended would be very efficient; the rubber pads sometimes used will not answer, as they stain the paper badly.

In finishing the prints, we obtain, by direct immersion in the fixing bath and subsequent washing, pleasing brown tints on Rives paper. These tints can be modified, after rinsing slightly from hypo, by immersion in a weak solution of a bichromate.

By the usual process of washing and toning in a weak acetate of soda and gold bath, we get perfect engraving black tints in the fixed and finished prints.

Michallet's crayon paper (cream tint) gives fine reds by merely fixing without washing. Whatman's drawing paper will yield similar red tints if treated with bichromate, as recommended above, after fixing. Of rough papers, I should give the preference to Michallet's for large work.

Having, I think, dealt quite fully with every point connected with the preparation of the sensitized paper, it may be convenient to append the formulæ for preparing the sensitized paper:

1.—SALTING SOLUTION.

Chloride of sodium (fine table salt).....100 grains (say ¼ ounce).
Bromide of potassium.... ..... ... . . 10 grains.
Water..... 20 ounces (one pint).

Solution of a bichromate to be added, a drop or two at a time, till a clear lemon color is obtained. N. B. —Avoid excess of bichromate.

2.—SENSITIZING SOLUTION.

Nitrate of silver..... 1 ounce.
Distilled (or rain) water.....10 "

Liq. ammonia to be added to the solution till the precipitate at first formed is just redissolved. N. B. —Avoid excess of ammonia.

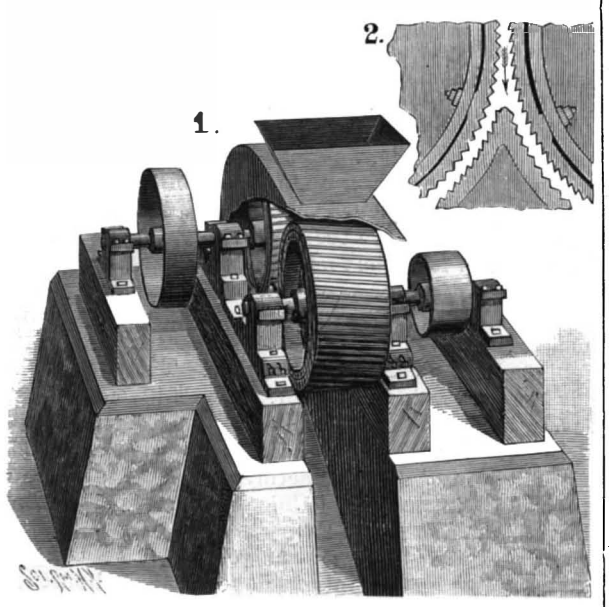
An acid sensitizing solution may be employed, adding one drop per ounce of nitric acid instead of the ammonia, or a proportion of citric acid if desired. The latter addition greatly modifies the color of finished prints; the former has not such effect.

In either case the prints require to be treated with an alkaline solution, say of washing soda, before toning.—Photography.

### AN IMPROVED COAL CRUSHER.

A crusher more especially designed for disintegrating bituminous coal, to improve the quality of the coke made therefrom, is shown in the accompanying illustration, and has been patented by Samuel Evans, of Elkhorn, West Virginia, and Francis J. Morgan, of No. 1023 South Jefferson Street, Roanoke, Va. The machine has a feeding and crushing roll and a cutting roll, adapted to rotate toward each other at different rates of speed, the foundations of the roller shafts being placed a suitable distance apart to form a delivery space and chute for carrying off the crushed material. On the periphery of the feeding and crushing roll are bolted segmental sections with diamond shaped ribs extending transversely at a slight inclination to the axis of the roll, the other roll having similar attached sections whose ribs are ratchet shape, with the cutting edges in the direction of the travel of the roll, and standing at an angle to the axis of the roll in an opposite direction to the ribs of the first roll.

Between the two rolls, as shown in the small view, is



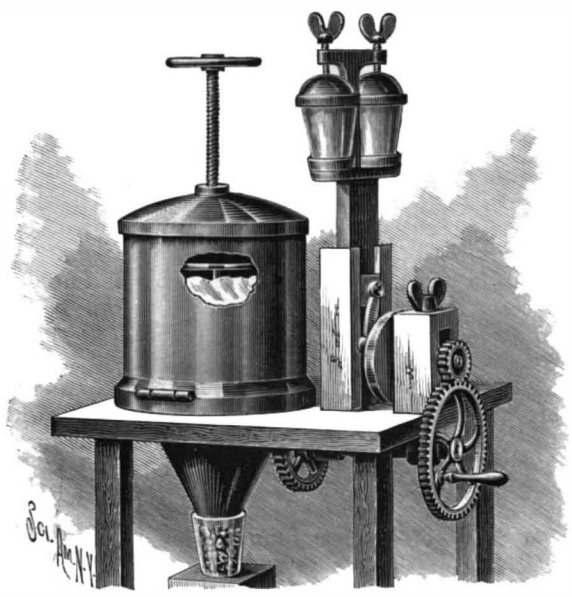

EVANS AND MORGAN'S COAL CRUSHER.

arranged a table with segmental sides and ratchet and diamond-shaped ribs, the table being vertically adjustable, so that its sides may be moved nearer to or farther from the peripheral surfaces of the rolls, as the material is to be reduced to a finer or coarser state. In order to prevent the breaking of the ribs by iron or other hard substances passed between the rolls, the inner roll bearings are set on rollers held on plates, permitting the bearings to slide and move the rolls apart, the shafts at their other ends being journaled in outer bearings by ball and socket joints.

THE sum of $2,500 has been granted to the St. Petersburg Medical Academy for carrying out X ray experiments.

### A COMBINATION ICE SHAVER AND MILK SHAKER.

To facilitate making a "milk shake" or other summer drink, the combination device shown in the illustration is adapted, while shaking the milk, to simultaneously cut or shave ice from a block for use in preparing the next drink. For this improvement a patent has been allowed to Max Raubold, of No. 758 East Market Street, Louisville, Ky. On turning the handle a gear and pinion actuate a crank disk and pitman to reciprocate a crosshead moving in vertical guideways,



RAUBOLD'S ICE SHAVER AND MILK SHAKER.

the crosshead carrying saucers to receive the glasses, the tops of which are engaged by covers held in place by set screws in a bracket extending upward from the crosshead. On the inner end of the operating shaft is a gear wheel in mesh with a gear near the outer periphery of a wheel across whose diameter extends a knife adapted to engage with its cutting edge the under side of a block of ice in an adjoining receptacle, the shaved ice passing through the open wheel into a hopper by which it is directed into the mixing receptacle. To prevent the turning of the ice as the revolving knife cuts away its under side, the top of the block is engaged by points on the under side of a disk held on a screw rod extending up through the cover of the receptacle, the turning of a handle on the upper end of the screw rod bringing the points down into firm engagement with the ice. The ice receptacle is hinged to its base, permitting the ice to be readily taken out and stored in the ice box or placed in position for shaving, and the milk shaker may be conveniently disconnected from the ice shaver, allowing the latter, if desired, to be used as a single device.

### Cycling Notes.

The novelist Rudyard Kipling, who for a long time has been an anti-cyclist, has recently learned to ride the wheel.

The Michaux Club of New York has introduced a variation of the Virginia Reel, called the "Wheel Reel." The riding is done very rapidly, the music playing at a lively rate.

Biltmore, the new estate of Mr. George Vanderbilt, is a wheelman's paradise. There are 95,000 acres in the estate and the system of roadways is so perfect that Mr. Vanderbilt, who is a wheelman, can go a hundred miles over a macadamized road without going off his estate.

The sprockets on wheels of this year's pattern are larger than heretofore. Large sprockets mean less friction, diminished tension on chain and consequently less pressure on the rear wheel and crank shaft bearings. They also tend to prevent the bending of the rear forks.

The physicians of Chicago enjoy peculiar privileges as regards transportation. For fifty cents he can procure of the city clerk a badge with a red cross which gives him the right of way. The physician can then pin on the badge and mount his wheel or carriage and all vehicles are obliged to yield him precedence.

A decree has just been rendered by the Minister of France which defines the status of cyclists in that country; the decree, while it compels the cyclist to carry a lamp, a bell and a name plate, recognizes their full right to the road. Cyclists are also permitted to use the foot paths outside of towns when the road is stone paved or undergoing repairs.

Sometimes the wick in a lamp will obstinately refuse to turn up in the ordinary manner, says the Wheel. It will seem firmly wedged at one side, while the other runs up in a point, causing the impatient owner weariness and vexation of spirit. To overcome this particular brand of lamp depravity, get a new wick, draw out a thread near the selvedge, and the wick will be found to be quite tractable when introduced into the burner, the cogs rapidly taking it up, and it will give an even flame when lighted.

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## THE NATIONAL ELECTRICAL EXPOSITION AT THE GRAND CENTRAL PALACE, NEW YORK.

The National Electrical Exposition, now being held in the Grand Central Palace in this city, has been organized in connection with the third convention of the National Electric Light Association in this city. It was formally opened by Governor Morton on the evening of Monday, May 4, and if the dense crowd which thronged the building is an earnest of the attendance throughout the month during which it will be open, it should be a complete success.

The excellence of the exposition was somewhat marred by the incompleteness which so often marks an opening night; as may be judged from the fact that neither Mr. Tesla nor Mr. Edison had their promised displays in working order. The various belated exhibitors, however, will soon have everything in place, and the opening of the second week will see the exposition in full swing. At the close of an oration by Commodore P. Vedder on the subject of "The Electrical Era," Governor Morton, using the same golden key with which President Cleveland set in motion the machinery of the World's Fair, turned on a flood of electric illumination, and a framework of vacuum tubes which surrounded him was set aglow with a blue fluorescent light. The pressing of the button also fired guns in San Francisco, New Orleans, St. Paul and Augusta, Me., and a message announcing the opening of the Exposition was dispatched to London, England.

EXTERIOR OF EXPOSITION BUILDING.

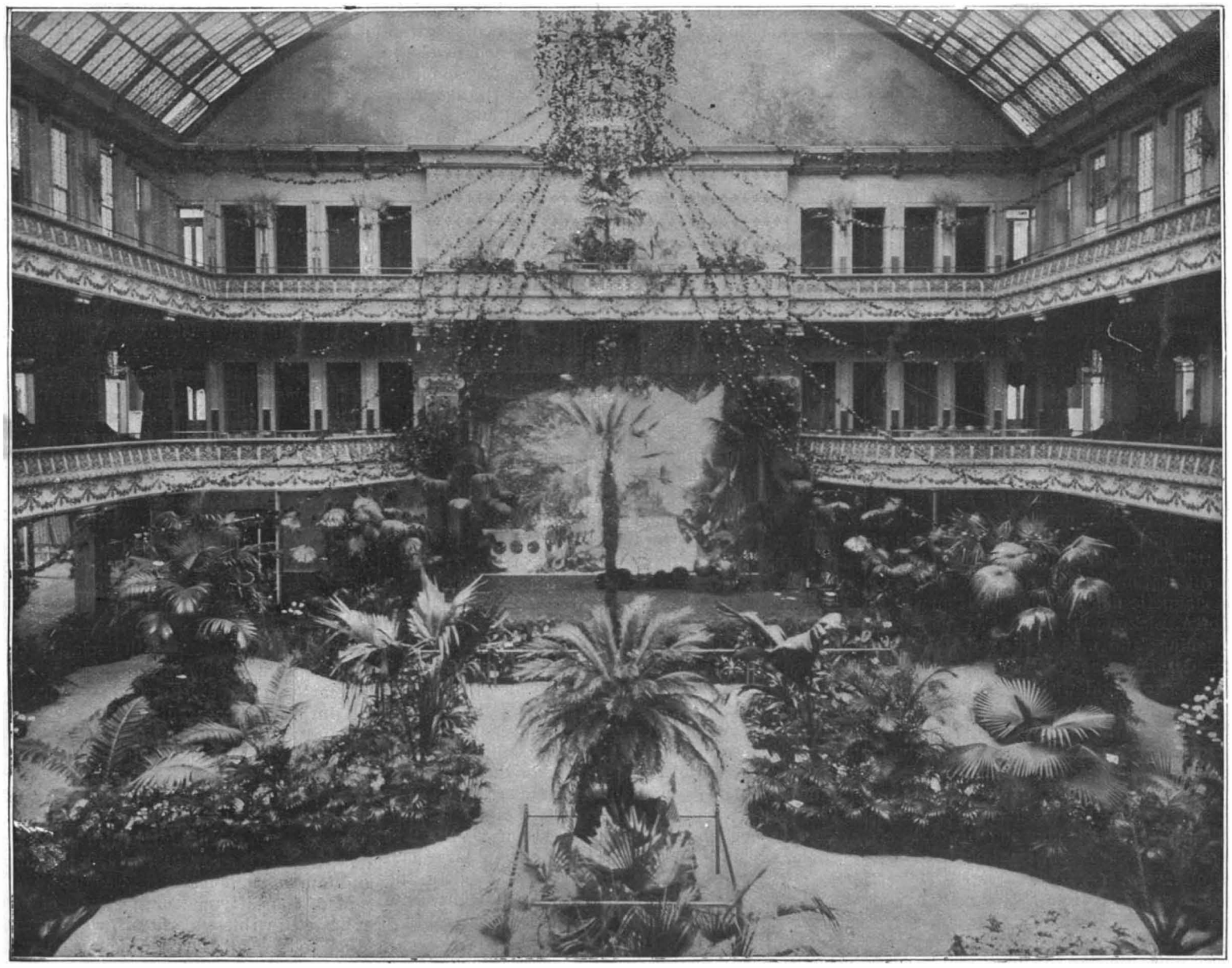
The steam and electric plant, located on the lower floor of the building and forming an important section of the exhibition, is thoroughly up to date. Steam is supplied by two equal units of the Root water tube boiler, forming one battery of five hundred horse power. Fuel is fed by the Wilson Manufacturing Company's automatic stoker, and the coal is brought from the rear of the boiler by the Hunt coal conveyor, and the ashes are returned by the same means. The engines and dynamos are good specimens of the latest practice in steam and electrical engineering, and nearly all are direct connected. As an instance of what can be done in the way of intelligent handling of the counterbalance problem in high speed engines, the visitor should notice a Harrisburg Ideal self-oiling engine direct connected to an Eddy multipolar dynamo. The engine (horizontal) is secured upon the same casting with the dynamo, and the whole stands clear of the floor upon three steel points. At 300 revolutions there is practically no vibration. On the same floor will be found full size sections and a complete model showing the construction of the Babcock & Wilson boiler. Adjoining this the Stirling Company show a water tube boiler.

The Brush Electric Company exhibit a 125 light arc machine and two others of 100 and 80 light capacity. The last named will be in operation on a rack of 80 lamps of 2,000 candle power. This will be driven by a 60 horse power General Electric motor, the total voltage being 4,000. They also show the first machine which Mr. Brush ever built—a one-lighter—and a 60 light machine which has been fourteen years in operation without repairs.

The bulk of the exhibit will be found on the main floor in the large hall. The Edison Illuminating Company, of New York, show, by means of a large painting, the interior of the Duane Street station, with its 600, 1,200 and 2,500 horse power generators—the last of which, they state, is the largest ever built. Here can be seen a full size model of the regulating section used in this station, and also full size sections of the station cable, and of the underground feeder, with a large size feeder box. On the walls is a photograph of the original direct connected "Jumbo" dynamo used at the old Pearl Street station, which had a capacity of 2,000 lamps, and opposite to this stands a full sized half model of the great dynamo at Duane Street, which has a capacity of 30,000 lamps. They also show applications of electricity to medicine, cooking and printing. In a separate room are to be found various applications of the new system of interior lighting by reflection, in which the lamps themselves are concealed. In the same room is a handsome board of various incandescent lamps, among which will be noticed a lamp with two carbons, for use in the sick room,

The Electric Storage Battery Company, of Philadelphia, show a very handsome electrobat motocycle, built by the Electric Carriage Wagon Company. It is furnished with the chloride accumulator, manufactured by this firm, and is driven by two 1½ horse power motors. At 8 miles per hour it will run 32 miles on one charging. This machine is similar to that which took the gold medal at the late Chicago contest. They also exhibit an entire battery of 128 cells, which may be charged from the Edison Company's street circuit when running under light load, at low rates.

Henry R. Worthington exhibits two electrically driven house tank pumps, one of 250 gallons per hour capacity and another of 500 gallons per hour. They are wonderfully compact and handsome machines,



MAIN HALL OF THE NATIONAL ELECTRICAL EXPOSITION, GRAND CENTRAL PALACE, NEW YORK.

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and the latter covers only about two square feet of floor space. They exhibit also a triplex steeple power pump, which they build up to 1,000 gallons per minute capacity, to work against a 300 foot head.

The Interior Conduit and Insulation Company, of New York, in addition to a display of their methods of insulation, have a very handsome exhibit of direct connected motors and dynamos. These include a direct driven printing machine, an organ with electrically driven automatic organ blower in place, and some direct connected motors driving exhaust fans. A specially interesting feature of this exhibit is an electrically driven dental outfit, with foot controllers for starting, stopping or changing speed. This is one of the handiest applications of the motor in the whole exhibition.

The Crocker-Wheeler Company display comprises a 200 kilowatt belt driven generator, a 50 kilowatt direct connected dynamo, and a very compact drilling machine in which the armature is mounted directly on the shaft. A curiosity in this exhibit is a 10,000 volt direct current armature, built for Prof. Crocker, of Columbia College.

A very complete exhibit of arc lamps is shown by the Adams-Bagnall Company, of Cleveland, which includes an oxidized copper 100 hour lamp, 1,600 alternations; an oxidized silver constant potential lamp, and many others of the A. B. pattern; also a line of their A. B. incandescent lamps. There is no centering to the carbons of these arc lamps, the arc remaining stationary in the lamp.

Not the least interesting booth in the Exposition is that of the Van Nostrand Company, of New York, which is filled with the latest electrical literature; and across the hall and on the second floor will be found the stands of some of our esteemed contemporaries which are devoted to the electrical industries.

The Electrozone Company occupy considerable space with a display of apparatus for the manufacture of electrozone, which they describe as a product of the electrolysis of sea water, having powerful disinfectant and antiseptic properties. It is claimed that this fluid is more effective than carbolic acid, and a microscopical demonstration is made of the destruction of germ life in a drop of water by spraying it with the electrozone.

An interesting exhibit is that of the Herzog teleseme, which is a telegraphic call that depends for its action upon the principles of electrolysis. It is shown in its application as a hotel office call and as a police call. The messages are read by the change of color in a metallic button.

Electric elevators are represented by the Sprague Electric Elevator Company, which shows a multiple sheave screw elevator machine and a worm gear driven machine.

The Niles Tool Works, of Hamilton, O., show the application of the motor to large shop tools—a specially interesting application being a No. 1 boring and drilling machine, driven by a constant speed motor attached to the countershaft, and a 37 inch boring and turning mill operated by a motor direct connected to the driving shaft.

A feature which is deservedly attracting much attention is the display of vacuum tube illumination by the D. McFarlan Moore system. Some samples of the application of this system to street signs and for the purpose of illumination are shown, a detailed description of which system will be found in the SCIENTIFIC AMERICAN of February 29.

Two large models occupying the center of the large hall are of special interest just now, viz., a model of the Lamb electric cableway, as now being applied for towing on the Erie Canal, and a model of the Niagara power plant. On one side of the latter model are some thirty receivers which have connection with Niagara and are claimed to give the roar of the Falls with a distinctness which makes it easily recognized.

At the far end of the main hall will be found the historical exhibit. It is very complete, and reflects great credit upon the management of the exposition. It includes a Patent Office exhibit of 360 models of electrical inventions, in which will be noticed Edison's first electric light station, telephone, telegraph and converter; the magnetic motor of Joseph Henry; the electric motor of A. Eickmeyer; the C. F. Brush magneto-electric machine; and models of a score of other machines destined to become famous at a later date.

If space allowed, one would wish to make detailed mention of the fine auto-telephone exhibit of the Tasker Electrical Construction Company, of New York; of the John Berry printing telegraph system; and of a host of other compact and well selected exhibits.

The W. J. Hammer historical collection of incandescent lamps contains models showing the early efforts of such men as Edison, Swan, Maxim and others. It is the result of seventeen years of diligent collecting, and has been gathered from all quarters of the globe.

The Morse collection comprises models, correspondence, and general relics relating to Morse, Vail, Henry and others connected with the early history of the telegraph. Particular interest attaches to a model of the first wooden telegraph apparatus, made entirely by Morse. The original, now in the National Museum at Washington, was completed in 1835, and with it, in the University Building, Washington Square, Morse first demonstrated the possibility of sending and receiving messages by electricity. Here also will be found a daguerreotype of Prof. Morse and his eldest daughter, taken by himself in 1840.

The Park Benjamin collection of ancient and mediæval literature relating to electricity is arranged in chronological order in several long cases. It commences with a set of Latin books which tell for themselves the story of ancient knowledge of the properties of amber and the magnet.

In the Edison historical exhibit are the tin foil phonograph; the pyromagnetic motor, one of his earliest dynamos, a large variety of telephones, and some valuable photographs and letters.

The Doremus historical exhibit contains among other interesting objects Henry's experimental induction coil; a "dithonotype," or copper electrotype of a daguerreotype, and a daguerreotype taken by Dr. Doremus in 1844.

Although it was not ready on the opening night, Mr. Edison will shortly have on exhibition on the second floor of the building his already famous fluoroscope, and many other samples of his later inventions and a practical exhibition will be made of the former. Mr. Tesla also will exhibit his new oscillatory machine, and the apparatus by means of which he hopes to do away with metallic circuits in telegraphing.

The above is but a brief review of an exposition which will well repay a visit not only by electrical experts, but by the general public. It is at once rich in historical interest and thoroughly up to date.

The Grand Central Palace, in which the present electrical exhibit is housed, is located on Lexington Avenue, between Forty-third and Forty-fourth Streets. The exterior view herewith presented is taken from Forty-third Street looking northwest. The building is a modern fireproof structure, seven stories in height. It is designed for use as a permanent exhibition building, the object of the Exhibition Company being "to facilitate the introduction of American products abroad by furnishing information to our people concerning foreign markets; and by exhibiting to the inhabitants of other countries specimens of our products, and disseminating among them comprehensive and accurate information as to our resources."

The building, which is seven stories high, consists of a large central exhibition hall, lighted from the roof, around which are arranged the various smaller exhibition rooms and lofts, which are devoted to the classified exhibits. The central hall was designed for the gathering of congresses of industrial, mechanical, and engineering societies, and for this purpose a wide gallery is carried round the hall at each floor level, the total floor space thus provided affording accommodation for a large concourse of people. In the accompanying cut the central hall is shown as laid out for a former flower exhibition. In the basement there is a power and light installation, which, of course, is largely increased to meet the necessities of such special exhibitions as that which is now being held.

### How to Kill Elm Beetles.

Prof. John B. Smith, the entomologist of the New Jersey State Experiment Station connected with Rutgers College, at New Brunswick, N. J., has devoted a great deal of time to the subject of elm beetles and how to exterminate them. The ravages of these insects have caused widespread regret in various parts of New Jersey, New York and Connecticut, particularly New Haven, over the destruction of hundreds of noble elm trees, and Prof. Smith was particularly busy last season explaining his experiments and advising precautions against the insects.

He has found that the pests are vulnerable to stomach poisons, and he makes his exterminator on the following formula: One pound of Paris green or London purple, mixed with 150 gallons of water; add a sufficient quantity of stone or shell lime, a pound for each pound of the poison; in order to give better adhesive qualities, add two quarts of glucose, or thick molasses, to every 100 gallons of mixture; when the water and lime have come to the boiling point, put in the poisons. This formula will have no bad effect upon the trees, for the soluble arsenic is neutralized by the lime. Another exterminator prepared by the professor is: Lead acetate, 11 ounces; sodium arsenite, 4 ounces, in 100 gallons of water, add adhesives to the mixture as before; thoroughly stir and apply.

The cheapness of these preventives and exterminators is remarkable. A hundred gallons of the first formula, which will thoroughly spray four large elm trees, cost about fifteen cents. Arsenite of soda in the second mixture may be obtained at about eight cents a pound, and acetate of lead at fourteen cents a pound.

One of Prof. Smith's contemporaries has recommended an emulsion of kerosene as a remedy. This he declares ineffective because non-poisonous.

### Notice.

A premium of $250 is offered by the SCIENTIFIC AMERICAN for the best essay on

THE PROGRESS OF INVENTION DURING THE PAST FIFTY YEARS.

This paper should not exceed in length 2,500 words.

The above-mentioned prize of $250 will be awarded for the best essay, and the prize paper will be published in the Special 50th Anniversary Number of the SCIENTIFIC AMERICAN of July 25. A selection of the five next best papers will be published in subsequent issues of the SCIENTIFIC AMERICAN SUPPLEMENT at our regular rates of compensation.

The papers will be submitted for adjudication to a select jury of three, to be named hereafter.

Rejected MSS. will be returned when accompanied by a stamped and addressed envelope.

Each paper should be signed by a fictitious name, and a card bearing the true name and the fictitious name of the author should accompany each paper, but in a separate sealed envelope.

All papers should be received at this office on or before June 20, 1896, addressed to

Editor of the SCIENTIFIC AMERICAN,
361 Broadway, New York.

### Botanical Notes.

In A. Lewinii, Herr L. Lewin (Ber. Deutsch. Bot. Gesell., 1894, pp. 283–290) discovered a poisonous alkaloid, to which he gave the name of anhalonine, and which was found to resemble strychnine in its properties. This alkaloid was found also in other species of Anhalonium, and in Mammillaria uberiformis, Cactus fimbriatus, C. pentagonus and Cereus flagelliformis.

Vegetable Rennets.—The common butterwort (Pinguieula vulgaris), a plant indigenous to Europe and America, has the property of giving consistence to milk. Linnæus says that the solid milk of the Laplanders is prepared by pouring it warm and fresh from the cow over a strainer upon which fresh leaves of the butterwort have been laid. The milk, after passing among them, is allowed to stand for a day or two until it begins to turn sour. It throws up no cream, but becomes compact and tenacious and most delicious in taste. It is not necessary that fresh leaves should be used after the milk has once turned; on the contrary, a small portion of this solid milk will act upon that which is fresh, in the manner of yeast.

The Yellow Bedstraw (Galium verum) also has the property of curdling milk, and has been used for that purpose, the leaves and flowers being the parts employed. "The people in Cheshire, especially about Namptwich," says Gerard (Herbal, p. 968), "where the best cheese is made, do use it in their rennet, esteeming greatly of that cheese above other made without it." The flower heads of the common artichoke (Scolymus) have long been known to possess the property of coagulating milk.

The Traveler's Tree.—The statement has often been made in the narratives of travelers and in botanical works that the Ravenala Madagascarensis, a splendid plant belonging to the same order as the banana, is called "Arbre du Voyageur" by the French in Madagascar on account of the water that is stored in the large cuplike sheaths of the leafstalks, and which is sought for by travelers to allay their thirst. Mr. E. Bureau in a lecture on the Flora of Madagascar reproduced in the Revue Scientifique disposes of this story as a myth. He admits the presence of the water, but says that the plant grows in regions where it rains all the year round, and where there is no difficulty in procuring water. Moreover, says he, the tree being very tall and the leaves being situated at the summit, it would be necessary for a person to climb to the top to get a drink. Nevertheless, the tree has very useful qualities. Its trunk furnishes an edible substance and is used for rough carpenter work; the flattened bark forms floorings, and the leaves are employed for the walls and roofs of huts. The leaves are also worked in different manners to form mats, plates, dishes, spoons and drinking vessels, that are changed at every meal. One is sure every morning of finding in the market a new supply of fresh leaves to renew his plates and dishes.

IN order to determine the relative digestibility of oleomargarin and natural butter, Dr. Adolph Jolles has carried out a long series of observations on dogs fed during four consecutive periods with natural butter and with margarin. According to a report made to the Imperial Academy of Vienna (N. Y. Med. Jour.), all other things being equal, it was found that from 97 to 98 per cent of the fatty matter was uniformly digested, whether it was butter or margarin which was used. During the first and third periods, while butter was given, 98·4 and 97·1 per cent; during the second and fourth, while margarin was used, 97·9 and 97·3 per cent of the fatty matter given was digested. It thus appeared in this experiment, where proper care was taken to have all the conditions similar, that natural butter and manufactured margarin had practically identical coefficients of digestibility and nutritive value.

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### THE GRAMOPHONE.

Making either permanent or transient records of sounds, as exemplified by Scott's phonautograph or Koenig's manometric flames, is no longer a novelty, but recording and reproducing musical sounds and speech are recent. Sound reproducing machines are no less wonderful than sound transmitting apparatus, and, although the talking machine may not find as wide a field of application as the telephone, it is perhaps more interesting and instructive, and has the additional peculiar charm possessed by anything mechanical that faithfully reproduces any of life's actions. If a machine talks, we are apt to regard it as almost human; if it sings, we look upon it as being artistic.

The versatility of the gramophone enables it to embrace almost any sound; military bands, instrumental solos, piano, cornet, clarionet, banjo, etc., songs, recitations, whistling, imitations. Educational features of the instrument are lessons in elocution, lessons on the correct pronunciation of different languages and the memorizing of verses, songs and music.

Some years ago we gave an account of the earlier work of the inventor, Mr. Emile Berliner, in this direction, and our present first page engraving illustrates the gramophone in its latest form. It is presented as a popular instrument for the use of everybody. It affords amusement to people of all ages, and also presents a means of preserving records of various kinds. In Fig. 1 is shown a gramophone provided with the reproducing apparatus only, it being designed for use in connection with records made by the Gramophone Company or the dealers. The instrument is provided with a turntable mounted on a pivot, as shown in Fig. 8, which is revolved by frictional contact with a rubber wheel on the shaft of the fly wheel. The latter is provided with a pulley and is driven by a belt extending around the larger pulley on the crank shaft. On the turntable is placed the rubber disk bearing the record. The sound box is mounted on a swinging arm, which also supports the conical tube or resonator.

Fig. 2 represents the recording instrument operated by a simple electric motor.

The essential parts of the recording instrument are the turntable, the worm screw which guides the carriage holding the recording diaphragm, and the recording diaphragm. The action of the mechanism is to so guide the recording diaphragm, while recording the sound, as to make it trace a continuous spiral line from the outer edge of the table to the center.

The method of making a sound record is to place upon the turntable a highly polished disk of zinc, previously prepared with a film of fat, exceedingly delicate to the touch of a lightly bearing stylus, but dense enough to resist an etching bath.

As the machine is set in motion, a delicately pointed finger or stylus pivoted at its center transfers the wave vibrations from the diaphragm to the zinc surface. The finger moves laterally, and literally writes the sound through the thin film which covers the zinc disk. During the operation the plate is kept soaked with alcohol from the glass reservoir seen in the cut. The object of this is to soften the film and to prevent the particles of film or dust from collecting around the point of the stylus or finger; by this method a true and exact sound wave is recorded.

The record made, the zinc disk is taken from the turntable and the alcohol is rinsed off; the disk is then placed in an etching bath of chromic acid. The length of time consumed in the etching depends solely upon the amplitude of the wave vibrations. Recorded waves of small amplitude receive short etching and those of large amplitude long etching. When taken from the etching bath, the disk is cleaned and is ready for the first reproduction.

Since the first reproduction consists mainly in cleaning out the groove, the sound is at first slightly harsh and grating. Two or three reproductions make the record smooth and quiet.

The record is now ready to go through the duplicating process. A copper matrix is first made by a method of careful electrotyping. From the matrix hard rubber duplicates are pressed nearly in the manner in which castings are made.

The rubber duplicates are superior to the zinc records in several ways. They will bear rough handling and an indefinite number of reproductions, whereas the zinc would burnish and soon wear away. They are louder and smoother than the zinc. The rubber records will stand over 1,000 reproductions, the zinc from 50 to 300, according to their delicacy. A first-class matrix can press out 1,000 perfect duplicates.

A peculiarity of the gramophone record is that it has almost the penetration of the original sound, although not the broadness of tone, so that if 1,000 gramophones could be worked simultaneously, it would be possible for an orator to fill a hall 1,000 times larger than his voice ordinarily would fill. Gramophone recording agencies have been established in Philadelphia and Washington, New York and Boston, and similar ones will be established in every city of importance, where the voices of those dear to us may be permanently recorded.

In Fig. 4 is shown the arrangement for producing the record of a cornet solo. The reproducing sound box, which is shown in Fig. 5, is provided with a diaphragm connected with a spring arm fixed to one side of the diaphragm cell, and carrying a point like an ordinary darning needle point. This point, when the instrument is arranged as shown in Fig. 1, rests in the groove in the record plate and follows the groove as the turntable is revolved. The engagement of the needle point with the groove in the record disk causes the spring arm to vibrate and produce vibrations in the diaphragm, which are the same as those of the recording instrument; as a consequence, the original sounds are reproduced in the resonator of the gramophone with a loudness and clearness which are surprising. The reproducing sound box is provided with a curved damping spring for reducing the vibration of the spring arm when it is desired to connect the sound box with ear tubes to be held in the ear. A cross section of the reproducing sound box is shown in Fig. 6. The manner of holding the sound box in the position of use is shown in Fig. 7, In Fig. 9 is given a much enlarged view of a section of a record, showing the sinuous nature of the grooves. An electric motor has been applied to the gramophone, as shown in Fig. 10, by means of which the table is rotated at a uniform speed, and in Fig. 11 is shown the adaptation of spring clockwork to rotate the turntable.

The type of reproducing machine which seems to find most favor is turned by hand, and as the groove in the record itself guides the sound box, thereby eliminating the necessity of a costly worm screw and intricate gearing, it moves so easily that with five minutes' practice a child can operate it so as to reproduce a band selection or a song in perfect tune. Those who object to manipulating the crank can have a simple motor gramophone that will reproduce the selections by merely turning a switch.

The modest plant first started by the Berliner Gramophone Company, 1032 to 1036 Filbert Street, Philadelphia, has been increased to four times its original size. Duplicates are pressed out by the thousands, showing the rapid growth of this fascinating little machine.

### Recent Decisions Relating to Patents and Trade Marks.

Jonathan Mills Manufacturing Company v. Whitehurst (U. S. C. C. A, 6th Cir., Taft, J.) 72 Fed. Rep., 496.

Assignment of Patents.—It appeared that Jonathan Mills made an assignment wherein it was stated that Myron W. Clark had an interest in the patent and there was a postscript as follows: "I hereby consent to the substitution of George T. Smith in place of said Clark in the above agreement, etc., Jonathan Mills." The courts below and above held that this statement was sufficient, after the assignment was recorded in the Patent Office, to put any subsequent assignee on his guard as to the interest of George T. Smith, and that such assignee must be charged with notice of every fact with reference to the company's interest in the patent which diligence and honest inquiry would have developed. It was also held that it was immaterial that the party mentioned in the contract or assignment as "The Smith Purifying Company" was really the "George T. Smith Purifier Company," because it was easy to ascertain whether the name was correct or not, inasmuch as the number of corporations engaged in the business was limited.

Cleveland Faucet Company v. Vulcan Brass Company (U. S. C. C., N. D. Ohio, Severens, J.) 72 Fed. Rep., 505.

Demurrer to Bill in Patent Suits.—Here the patent in suit named other prior patents as showing the prior art, and defendant demurred to the bill on the ground that the patent was void on its face. It was held that the patents mentioned in the patent in suit were not before the court and could not be considered on demurrer. In such case the court cannot apply any special or peculiar knowledge it may possess, but only that knowledge which is possessed by ordinarily well informed people.

Patent for Force and Drain Faucets Void.—The Weatherbee patent, No. 353,723, is void, as there is no invention in merely bending the piston rod of the air pump inward toward the faucet, so that both may be carried through the same opening in the casing.

American Fiber Chamois Company v. Buckskin Fiber Company (U. S. C. C. A., 6th Cir., Taft, J.) 72 Fed. Rep., 508.

Demurrer to Bill in Patent Suits.—It is well settled that the question of novelty and invention may be raised by demurrer to the bill of complainant, that the court may take judicial notice of facts of common knowledge, and it may refresh its recollection as to such facts at the date of application by reference to any reliable printed source of information.

Mechanical Process.—A process of rendering wood fiber paper soft and pliable by moistening it with a thin water solution and then crumpling and pounding it and then smoothing it is not a mechanical process or aggregation of functions, but is a true process.

Fiber Chamois Patent Valid.—The McLaughlin patent, No. 511,789, is valid on its face and the step therein for moistening wood fiber chamois paper with a thin solution of gelatine is not anticipated by a patent which calls for the use of a "suitable size" for a similar purpose.

American Fiber Chamois Company v. Port Huron Fiber Chamois Manufacturing Company (U. S. C. C. A., 6th Cir., Taft, J.) 72 Fed. Rep., 516.

Construction and Infringement of Fiber Paper Patent.—The McLaughlin patent, No. 511,789, for a process for manufacturing imitation dressed chamois and buckskin from paper pulp in sheets, if valid, is limited by the prior art and the original specifications and the patentees' prior Canadian patent to the crumpling and pounding of the paper when moistened with a thin solution of gelatine or other adhesive solution, and is not infringed by treating in a similar manner paper moistened merely with water.

Misconduct of Patent Owner Toward Competitors.—The action of the owner of a patent in harassing purchasers of competitors with threats of litigation when no possible grounds of action exist against them, in attempting to dismiss his bill of complaint and in delaying the taking of evidence until after the defendants begin the taking of their testimony, is condemned.

Heaton Peninsular Button Fastener Company v. Schlochtermeyer (U. S. C. C. A., 6th Cir., Taft, J.) 72 Fed. Rep., 520.

Button Fastening Staple Patent Void.—The Vinton patent, No. 324,053, and the Prentice patent, No. 451,070, have been held void on demurrer for want of patentable novelty apparent on the face of the specification. The Vinton improvement consisted in making a V-shaped joint, the apex of which is located at one side of the center line of the leg of the staple, and which is pressed or flattened and thus made broader than the diameter of the wire from which the staple is produced. The Prentice patent made a slightly different angle between the body of the legs, so as to make the crown portion with a double reverse curve, instead of a single curve.

Richardson v. Campbell (U. S. C. C., N. D. Pa., Atcheson, J.) 72 Fed. Rep., 525

Burden of Proof as to Priority of Invention.—Where the defendant claims that he was the first inventor, although he filed his application after the complainant did, the burden of proof is on him, and he must support his claim of priority by evidence which is clear and free from reasonable doubt.

Garment Hook Patent Valid.—The De Long patent, No. 462,473, is held valid and is construed.

Zwietusch v. Wittemann (Com. of Patents), 75 O. G., 183.

Access to Files and Papers in Interferences.—After the preliminary statements have been received and approved, each party may have access to the files and papers of the other, but if the application contains a description and claims of one or more inventions not related to the one in use in such a manner as to affect its scope or meaning, the opposing party should not be allowed to inspect this part of the application.

Dashiel v. Grosvener (U. S. Sup. Ct.), 75 O. G., 507.

Breech Loading Cannon Patent Construed.—Claim 1 of the Seabury patent, No. 425,584, cannot, in view of the prior art, receive a broad construction, but must be limited to the precise mechanism described.

Prior Inoperative Devices.—Prior inoperative devices or those which have proved so far failures that the inventors have not taken out patents for them, should not be considered as anticipating a subsequent patent. The fact that an invention is patented is some evidence of its operativeness and utility. A device which is not perfectly operative, but can be rendered so by a slight alteration, is sufficiently operative for the procurement of a patent.

Andrews v. Landers, Frary & Clark (U. S. C. C., Conn., Townsend, J.), 75 O. G., 510.

Contract for Articles Containing a Patented Improvement.—A contract to pay for articles of manufacture containing a patented improvement covers all articles of a simpler and less expensive construction than that shown in the patent, made so by the omission of unnecessary details of construction, although they are, in some respects, unlike the patented article. Manufacturers who have stamped articles made by them as patented cannot deny that they contain the improvement set out in the patent.

A CURIOUS case of deception is reported in an ornithological journal. It is said that a person painted seven turtles' eggs and sold them as the rare eggs of the Carolina paroquets, receiving $10 apiece for the doctored eggs. The hand-painted egg was a fraud that surprised the oologists when they learned of them.

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### DOG POWER AS AN AUXILIARY IN WHEELING.

From time immemorial man has sought to utilize the dog as a beast of burden. This has been compassed in various ways. Sometimes the dog is put into shafts and made to pull small carts or sledges; this is a daily sight in many of the countries of Europe. The dog has proved useful for this purpose where other animals have proved worthless. For an example it is only necessary to cite the dogs of the Esquimaux. Inventors early recognized the possibility of impressing dogs into service by making them run dog motors. Ever since the days of the old velocipede, inventors have also sought for some kind of motor for bicycles and tricycles which would obviate the fatigue resulting from working the pedals; steam, compressed air, springs, electricity and many of the hydrocarbons have had their turn, but it remained for the Alsatian to adapt the dog to the needs of locomotion in the last decade of the nineteenth century.

We are indebted to Mr. Joseph Becker, of Washington, D. C., for the photograph from which our engraving was made. He took this photograph at Strasburg last summer expressly for the SCIENTIFIC AMERICAN.

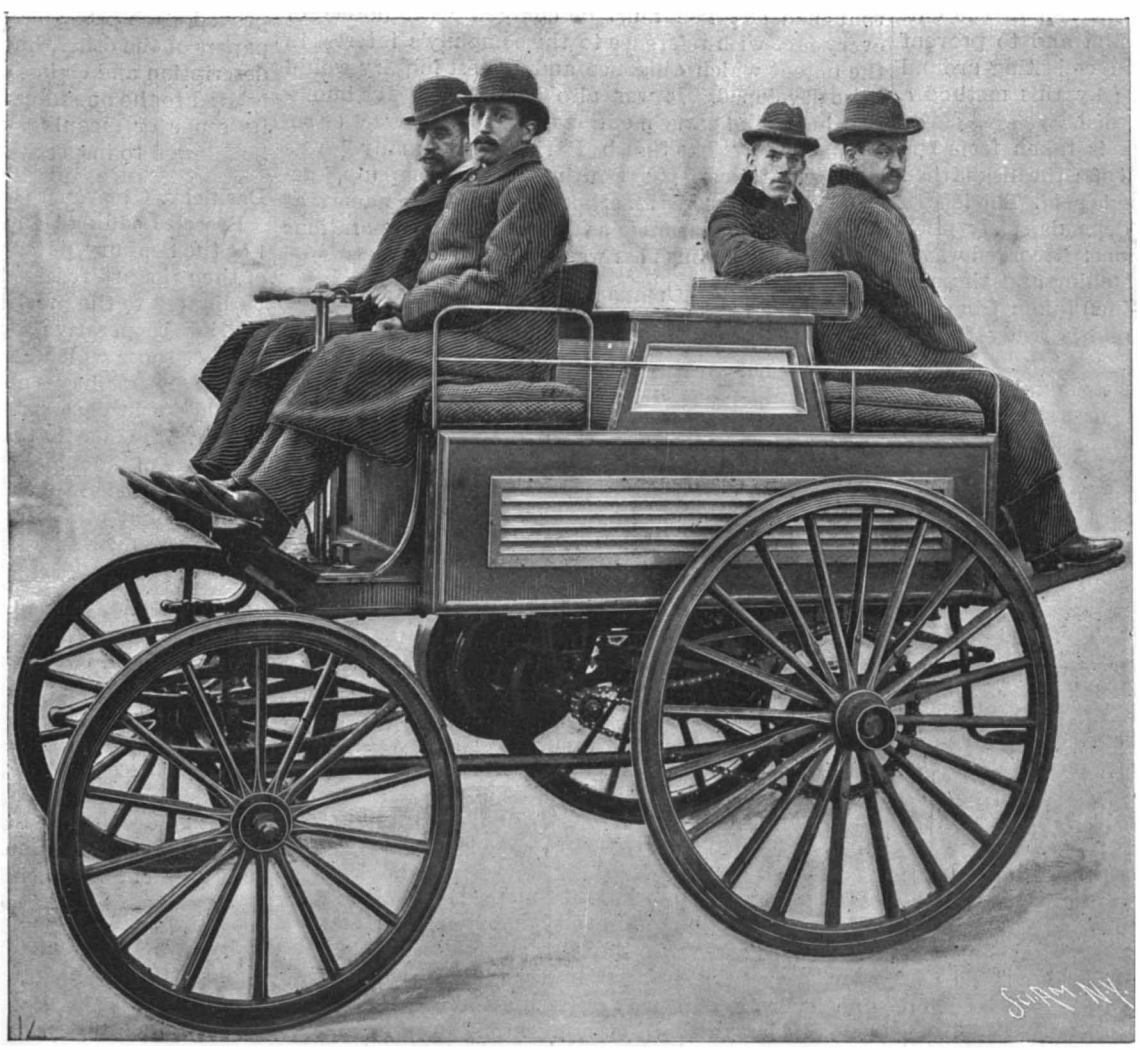
The dog is hitched behind the tricycle to the end of an adjustable harness rod and is chained to a point under the saddle. An appropriate harness is provided for the dog. Mr. Becker says: "The first impulse is to pity this good little doggie and to blame his big, heavy master for working him so. But this is soon forgotten when you have seen this sturdy little fellow at his task tugging and clawing with the greatest earnestness, apparently delighted with his task." Possibly he is so, but, though he might have to work hard when the tricycle was going slowly, still, when the speed is increased, the opportunities for "soldiering" would be limitless.

A CANINE AUXILIARY FOR A TRICYCLE.

### THE DE LA VERGNE HUNTING TRAP.

In the SCIENTIFIC AMERICAN of December 14, 1895, we illustrated the "motor drag" made by the De la Vergne Refrigerating Company, of New York City. We now show a somewhat smaller conveyance of the same type, called by them a "hunting trap." The hunting trap is driven by a single cylinder motor of a modified Benz type. The motor makes from 350 to 400 revolutions and is of four horse power. The weight of the engine is 300 pounds. The carburetor and water tank are both done away with, a condenser being used, which renders thirty pounds of water sufficient for a run of eight or ten hours; the cylinder and water jacket are cast in one piece. The speed is controlled by means of a friction clutch, which was invented by Mr. J. C. Bleveney, superintendent of the De la Vergne works. The wagon can be reversed without stopping the engine by shifting one of the belts; a wagon brake is provided for use on hills or where a sudden stop is to be made. The noise of the exhaust is stifled in a muffler, in which is placed a condenser which prevents disagreeable odors by condensing the unburned gases. The power is transmitted to the wheels by means of a chain and sprocket wheels; the steering wheels are pivoted at the hub. The explosion is produced by an electric spark, the battery being placed under the front seat, where is also the gasoline tank, which contains enough gasoline for a long run. It is said that the cost of running is one-half cent an hour for each horse power. The hunting trap weighs about 1,500 pounds and has a seating capacity of four, with ample space for guns and other hunting equipment. This vehicle received an award in the recent race for counterbalance on engine. The Emperor William, of Germany, has recently purchased a somewhat similar hunting trap.

The De la Vergne Company have, we believe, a new motor carriage in process of construction. They are also makers of the Hornsby-Akroyd oil engine.



DE LA VERGNE HUNTING TRAP.

### Some Queer Mail Routes.

Probably the most unique way of transporting mails known to the United States Post Office Department is that in daily use between Telluride and Smuggler, Col. The mining town of Telluride is located at the head of a picturesque gulch. The mountains rise in majesty to cloud-piercing heights about the town, and from every precipitous draw between the giant peaks foaming cascades, waterfalls, and roaring streams come down from the snow-laden summits to swell the torrent of the San Miguel, which rushes through the town. Four miles above Telluride is Marshall Basin, situated among the snowy peaks and far above the timber line, and in this basin is the little mining settlement of Smuggler, where the employes of the great Smuggler-Union and Tom Boy mines make their homes. Although the inhabitants have a post office of their own, the postal authorities do not guarantee a regular service, because of the difficulty of keeping a trail open in the winter time. The dangerous snowslides constantly threaten destruction to the hardy miners who scramble through the snows up the steep trails to the settlement in Marshall Basin. Until in recent years all supplies for the camp in Marshall Basin were transported thither by pack animals. Timber for the mines, coal for the boilers, and iron rails were dragged over the trails or packed securely about swaying pack saddles and carried to an elevation of 12,000 feet by the burro. When winter closed down and the burro trains could no longer be driven on schedule time, the miners would take turns in going down on snow shoes to get the mails and a few necessary supplies that could be carried upon their backs.

But the practical application of the endless chain by the inventor of the Huson tram has greatly facilitated the transportation of supplies from Tulluride up to Marshall Basin. Great iron buckets, each carrying down the mountain a half ton of ore, furnish by their weight the active power which drives the endless chain from which they are suspended. In these buckets, upon their return, the necessary supplies for the camp are placed. One of these buckets is painted a bright red color and the letters "U. S. Mail," in black, designate the use to which it is put. The daily mail for the Smuggler post office is now delivered as regularly across the four miles of precipice, snow-buried gulches, and giant mountain ruggedness with as much safety as between two settlements on the prairies of western Kansas or Nebraska.

A free delivery system is in vogue in the mining districts, though the postal authorities have nothing to do with it. From every mountain post office trails diverge up every draw and gulch. A miner setting out for his cabin, perched somewhere far up on a mountain, will take with him all the mail belonging to his neighbors, though they may live miles from his place. At each turning point a small box will be found nailed securely to the trunk of a stout old pine tree, and upon this box is scrawled the names of all miners who must pass that tree in going to their respective cabins. In this box the last man from town deposits all the mail belonging to miners living up that particular gulch. From that gulch a miner will occasionally descend for mail, and as he returns up his trail he deposits in turn the several pieces of mail in other boxes placed at convenient points. In this manner one man can save many a weary step to other miners who live out the long winters in the very heart of the Rocky Mountains. Mails are collected in a similar manner, and often small errands are likewise done. Money deposited in mail boxes for the purchase of stamps, tobacco, and other notions light in weight is always properly respected, and the mission fulfilled, no matter how much the snowshoe pedestrian may be under the influence of good fellowship as he returns from town.—San Francisco Post.

A SERIOUS landslide is said to have taken place at Trub, about twenty miles east of Berne, Switzerland. A landslide is also reported to have taken place at Bondesir, Saguenay County, Province of Quebec, Canada.

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### THE OLYMPIC GAMES.

After a lapse of fifteen centuries Greece has seen the revival of her Olympic Games, and in this revival it is gratifying to national pride to be able to chronicle that American athletes were more successful than those of any other country. The Olympian Games were the most prominent of many similar periodic celebrations or festivals in other places. The Olympian Games were first held in 776 B. C. in Olympia in Elis. The festivals were celebrated at intervals of four years in honor of Zeus. The importance of the games was so great that the Greeks computed time by them, the period between one celebration and the next being called an "Olympiad." For the country at large the festival ministered to the selfish and malignant passions of rival cities, each of which felt its honor concerned in the success of the individual. To the winner, however, the games brought lifelong honor, for when he returned to his city the walls were thrown down to give him entrance, he was caught up and borne in triumphant procession and he was freed from all taxes. The games were finally abolished in A. D. 394 by the Emperor Theodosius.

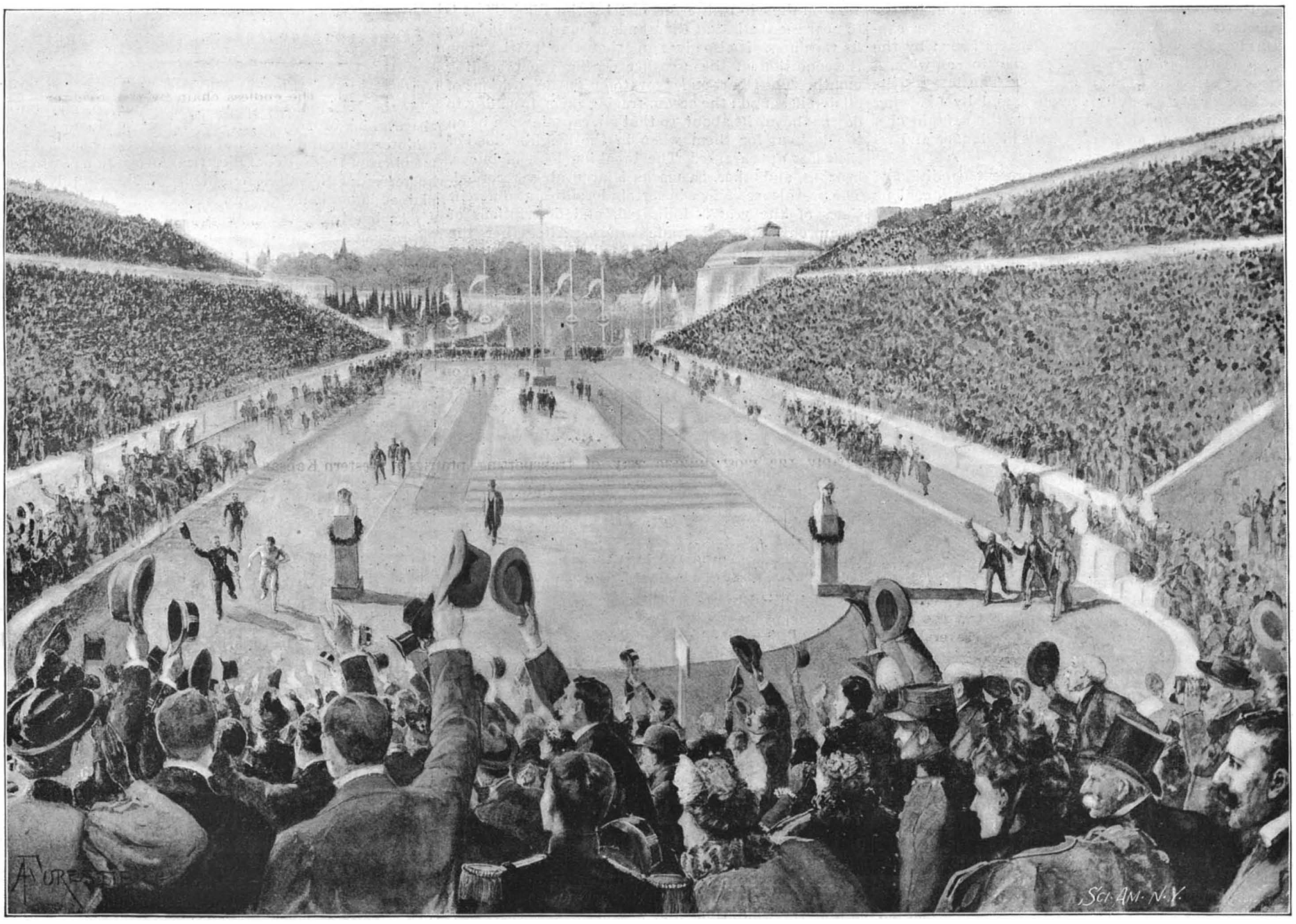
In walking through the Stadium of Athens on April 6, while the thousands of spectators rose to their feet, it must have been a proud moment for King George of Greece and Queen Olga. The Stadium is one of the finest amphitheaters in the world. It was scientifically excavated in 1869-70 at the expense of the king. Its recent restoration was made possible through the munificence of a rich citizen of Alexandria. It is 656 feet long and 160 feet wide and its seating capacity is 47,500. The empty amphitheater was imposing, but when filled with the gayly costumed crowd the scene was one which will never be forgotten by those that witnessed it. What must have been the sensations of the victor when the countless thousands of spectators rose from their seats and the applause of the individuals was blended into one great body of spontaneous and generous enthusiasm? It is little wonder the simple crowns of olive obtained under circumstances like these are held as priceless.

We have already published in the SCIENTIFIC AMERICAN of April 18 a list of the principal events and their winners. The interest throughout the games was unabated and the applause was hearty in the extreme. It was indeed hard for the Greek to see the American flag go up so many times in succession. After several disappointments the Greek flag was raised amid cheers only to be replaced immediately by the stars and stripes, as the winner had been erroneously announced; for an instant you could almost hear the crowd choke down its bitter disappointment, but after a moment's hesitation it broke out into magnificent applause.

The two great dramatic events were the throwing of the discus and the run of 40 kilometers from Marathon. When Robert Garrett, of Princeton, threw the discus 95·6 feet, defeating the Greek champion Paraskevopoulos by 7½ inches, the Greeks felt keen disappointment at being beaten at their own sport. Their chagrin was allayed by the magnificent victory and wonderfulr ecord of Loues in the race from Marathon to Athens, 26.1 miles in 2 hours, 48 minutes.

When the signal gun announced the approach of the winner all rose from their seats and strained their gaze toward the entrance to the Stadium. The cavalry dashed down the street, clearing the way for the runner. He was sighted approaching the goal with weary, panting strides. In an instant there arose a mighty cry of "We win!" "It is a Greek!" The athlete was seized by the two princes, and he passed the king making a proud salute. Hats and flowers were thrown into the arena, and it seemed as though the applause would never cease. Then followed, according to the custom of ancient Greece, the bestowal of the much coveted olive crowns, which were presented by the king with a diploma.

The American athletes were charmed with the attentions which they received at the hands of the king and Crown Prince George. They were banqueted several times in the palace of the king and were entertained in various ways. When leaving Greece they were serenaded by the people over the whole line from Athens to Patras. It is almost needless to say the American athletes were enthusiastically received at their various colleges on their return. For our engraving, we are indebted to The Illustrated London News.




**ATHENS—SCENE IN THE STADIUM AT THE REVIVAL OF THE OLYMPIC GAMES.**

### Arctic Sunburn.

To hear of suffering from heat in the Arctic regions sounds incredible to those who have never been there, says a contemporary. Lieutenant Gilder relates the experience of his party from this cause while one summer in King William's land, and declares that probably nowhere on earth is the traveler more annoyed by acute sunburn than in the frigid zone. The heat of ordinary exercise compels him to throw back the hood of his fur coat, and by thus exposing the head not only his entire face becomes blistered, but—especially if he is fashionable enough to wear his hair thin on the top of his head—his entire scalp is affected about as severely as if a bucket of scalding water had been poured upon him. At a later period, Lieutenant Schwatka's entire party, while upon a sledge journey from Marble Island to Camp Daly, were so severely burned that not only their faces but their entire heads were swollen to nearly twice their size. And a fine looking party they were. Some had faces so swollen that their eyes were completely closed on awakening from sleep. When one was fortunate enough to be able to see the others, he could not refrain from laughing.

### A Great Mosaic.

The British vice-consul in Venice, in his last report, says that mosaics still continue in great demand there. The Venice and Murano Company executed last year a splendid mosaic for a palace now in course of construction in Vienna. It measures 1,000 square feet, and is copied from cartoons by the painter Edward Weith. It represents the five parts of the world. Europe stands in the center of the frieze, represented by the symbolic figures of its various nations, having on one side the emblems of industry and trade, and at the top the emblem of the flying genius of light. On the right are the figures of Asia, India, China, and Japan, with their rajahs, mandarins, and the allegorical chrysanthemum. Next follows Africa, with camel drivers, palm trees, and other African symbols; on the left America and Australia, with natives on horseback and on foot, foliage, and other emblems. All this variety of types, from the fair Circassian down to the negro, and the display of costumes, from the most decorative to the simplest, have enabled the painter to arrange twenty-four figures with great delicacy of color and in an artistic manner. Over these figures, which rest on an ornamental base, a blue sky reflects all around its light so as to unite all the tints of the mosaic, and to give the whole a harmony of effect which is said to be most delightful to the eye. The same company is executing another important mosaic for the apse of the Guards' Chapel at the Wellington Barracks, in London, from cartoons painted by Messrs. Clayton and Bell.—London Times.

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### Measuring Ocean Storms.

BY GEORGE ETHELBERT WALSH.

The study of ocean storms has been of inestimable value to the shipping interests of this country, and each year the laws of sea storms are understood more perfectly through the indefatigable efforts of the United States hydrographic office. The collection of meteorological observations by telegraph on land was very simple compared with the labor that confronted the scientists a few years ago engaged in predicting the condition of the weather on the ocean. No telegraph stations presented them with elaborate data about the force and direction of the wind, the condition of the air and temperature, and the many other little points so essential to the weather bureau in arriving at their conclusions. It is an exact, but simple, science now which forecasts the weather on land. A study of the reports invariably gives correct knowledge concerning the atmospheric conditions that are likely to prevail in certain localities during the following twenty-four hours.

The hydrographic office, without the means and facilities of the weather bureau, has labored during the past ten years to accomplish similar results upon the ocean. Millions of dollars' worth of shipping have been saved by the urgent warnings sent out by the officers of this department. Mariners and sea captains have been educated by the charts issued by the office so that they know which way to run when a storm of a certain kind approaches. The laws of the sea storms are carefully compiled, and by following the directions on the storm charts, the captain of a sailing craft or ocean steamer finds his danger and responsibility greatly lessened.

The work of arriving at the present condition of affairs has been long and difficult, as well as ingenious and interesting, and the landsman hardly appreciates what has been done by the government to protect the ships from danger. In order to measure the storms, it was necessary to obtain reliable data. The force and direction of the wind over a wide extent of ocean territory had to be ascertained, as well as the height of the barometer and hygrometric state of the air. In the absence of telegraph stations, the hydrographic office had to establish stations on the ships and steamers. Forms for keeping observations were issued by the office to every captain of a vessel touching any American port. These forms were to be filled out and mailed to the headquarters at Washington. In return for this labor every captain who complied with the rules received free the monthly pilot chart and all of the publications of the hydrographic office.

By this system, when once put into general operation, the office obtained full and complete reports of every storm by a great number of sailing masters. The vessels would be scattered over a wide territory, some being near the center of the storm, others on the edge, and a few outside of the storm area. The reports gave detailed meteorological information about the clouds, temperature, height of barometer, force and direction of wind, amount of rainfall, and the hygrometric state of the air. It would be several weeks after a storm before all of these descriptions would reach Washington, but when they were all in they were studied carefully. From this pile of data a map of the storm was constructed, showing its exact movement and action from its inception to its final destruction. A repetition of this method soon enabled the department to construct a great number of maps of ocean storms in all parts of the world, but more especially of those along the Atlantic coast.

These maps furnished the data for studying the nature of sea storms. From them the office constructed the storm maps and charts, and compiled the rules and directions that are given to mariners when encountering a storm at sea. These directions enable the captains to ascertain, in advance, the approach of a severe storm, and to determine whether it is a mild, ordinary gale or a hurricane. If a dangerous storm, rules are given to determine its center. With this information furnished, the captain of an ocean steamer can steer to one side and encounter only the edge of it. Directions are given for a sailing vessel to run in a certain direction, and if it is necessary to "heave to," explicit information is given as to which side she should be brought to in order to prevent being "taken aback."

The hurricane is a dangerous storm upon the ocean either for steamship or sailing craft, and it is essential for safe navigation that a captain should understand its nature, its force, and the general direction it is to blow in. By consulting the general laws of storms, and taking observations of the state of the air and weather, he can soon arrive at pretty correct conclusions concerning the approaching hurricane. A few come up in the tropics with such force and rapidity that it is hard work to make proper preparations beforehand; but of the many vessels caught in the hurricanes and wrecked, a vast majority of them are navigated by captains who do not pay much attention to the rules and warnings of the hydrographic office.

More dangerous than the simple hurricane upon the ocean is the cyclone. The laws concerning this variety of storm are very explicit, but the storm always advances rapidly, and even the most cautious captains are frequently caught in the circular winds which form the center of the cyclone. The peculiar revolving action of the wind creates the greatest disturbance of the waters, and the rough seas are about as dangerous as the cyclone itself. The first duty of the captain upon the approach of a cyclone is to find out the general direction in which the storm is moving, and then either to sail or steam away from the center. Unless one understands the laws of sea storms, it is impossible to make the right course, and the ship is practically helpless and at the mercy of the elements. Before the hydrographic office elaborated the present system of avoiding storms at sea, it was mere good luck that would enable a captain to escape from the fury of a sea cyclone.

The Monthly Pilot Chart is a small publication issued by the department that attempts to forecast the weather in a general way upon the ocean for a month in advance. That this is far more difficult than predicting the weather twenty-four hours in advance by the weather bureau can readily be comprehended, and also that it will be apt to contain more errors. But, on the whole, the forecast by the Pilot Chart is so near the truth that thousands of mariners abide by its warnings. It also gives an exhaustive treatise upon the condition of the weather during the preceding month. The Chart endeavors to mark the positions of all derelicts upon the ocean, tracing them from day to day as they drift about, so that sea captains can be on the lookout for them when in the neighborhood of their last appearance. The breaking loose of buoys, beacons, and other sea marks is accurately recorded. The prevalence of fogs in certain localities at different times of the year is indicated, and descriptions of ocean currents and trade winds. Altogether the Monthly Pilot Chart is a compend of sea lore that is indispensable to every mariner.

The hydrographic office made the first successful attempt a few years ago to determine accurately the direction and force of ocean currents. Form slips of paper were given to the captains of vessels, who dropped them into the sea at different points, giving the date, latitude and longitude. Descriptions of the bottles were forwarded to our consuls in all parts of the world, and efforts were made to collect them on every coast where they might drift. Between one and two hundred of these bottles were collected and forwarded to the Hydrographic Office at Washington. From the course taken by the bottles elaborate and trustworthy maps of the currents of the ocean were compiled. These maps of the ocean currents are today the best in existence.

While the main hydrographic office is at Washington, branch offices have been established at New York, Philadelphia, Boston, Baltimore, Norfolk, Savannah, New Orleans, San Francisco, and Portland, Oregon. Complete copies of all the publications of the department are kept on file at these branch offices, so that captains can consult them at any time. Weekly notices of the weather are sent to these branch offices, and very few captains start out upon a voyage without first consulting the weekly forecast of the weather. If storms are indicated in his pathway, he is very apt to wait a few days, or change his course. The most complete set of charts in the world are also kept on file at each branch office. These are made up from those of the coast survey, the hydrographic office, and those purchased from the British Admiralty. These charts are used more for references. By studying them a captain can determine what maps he will need for a certain voyage, and what other information concerning the wind, tides, and weather.

The hydrographic office is now divided into the divisions of sailing directions, meteorology, archives, chart construction, and charts. The hydrographer of the navy is at the head of the department. Each branch is under a special officer, and their publications are kept right up to date by an interchange of bulletins with all foreign governments. The whole work of the office and the branch offices is performed with great care and zeal, and probably no other work of the government does so much toward saving life and property as this one.

### The Millennial Exhibition at Budapest.

Budapest is one of the most charming cities of Europe, and the Millennial Exposition, which was opened by the Emperor Francis Joseph, as King of Hungary, on May 2, bids fair to bring a large number of visitors to that city. The exhibition is intended to commemorate the millennial anniversary of the foundation of Hungary. It is meant to set forth the moral and intellectual power of the Hungarian people. The grounds of the exhibition cover 5,000,000 square feet, and the buildings and pavilions, numbering 169, were erected at a cost of $4,020,000. The elaborate series of fetes, festivals and historical pageants which will take place within the walls of the exhibition will render it unique, even in this age of national and international expositions.

### Notice to Our Readers.

In order to obtain the opinion of the readers of the SCIENTIFIC AMERICAN as to what invention *introduced within the last fifty years* has conferred the greatest benefit upon mankind, we publish the accompanying card, which please cut out and return to the editor. Those who preserve the paper for binding and do not desire to deface their files, or who read this notice at a library, will please answer by postal card. It is desired to get as full a vote as possible. The result of the vote will be published in the *Special 50th Anniversary Number of the* SCIENTIFIC AMERICAN *on July 25.*

Editor of the SCIENTIFIC AMERICAN.

Dear Sir:

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### The Ethereal Electric Light.

At the National Electric Exhibition in this city, on the evening of May 6, Mr. D. McFarlan Moore gave an interesting and successful demonstration before the members of the National Electrical Association of what he termed ethereal electric light, which was fully explained in our issue of a few weeks ago, vol. lxxiv, No. 9. As has been stated, the gist of the invention or improvement lies in inclosing the circuit breaker of the primary circuit of an induction coil in a vacuum tube, whereby a perfect make and break contact is made without any loss to the contact surfaces. A continuous uniform vibration thus ensues which, in turn, produces continuous and uniform pulsations in the fine wire of the induction coil, producing uniform discharges from the terminals.

He illustrated on the screen many forms of tubes and explained their characteristics. He could obtain better results with a glass tube in which there was a partial vacuum without any interior wire terminals than with, and simply wraps a piece of wire around the exterior ends of the tube, which is enough to produce a glow in the interior.

A very singular experiment was the holding in one hand a connected tube which glowed brilliantly, and the taking hold of the hand of another person who held at arm's length a second tube. As soon as the hands were grasped the second tube began to glow with half the intensity of the other. The use of a suspended wire screen from the ceiling was shown. Being connected with the regular terminals of the induced coil, it produced a magnetic field of some kind, causing tubes of glass held in the hand near it to glow very brightly, and suspended tubes in the form of letters of light to appear. It furnished a capital explanation or suggestion for the production of mysterious light at seance circles of spiritualists. Mr. Moore remarked that the quality of this light was more like daylight than any other, and demonstrated what a square inch of daylight would look like; he also showed various forms of incandescent lights operated on this plan, including an example of a real electrical fountain which was very pretty.

The novel applications of the tubes to the lighting of rooms was shown; the light has a peculiar softness that is quite remarkable, and is to be produced so easily that every home can have it. The method is still in an experimental state, but has a good future. Much applause was given the lecturer on the success of the various steps of his demonstration.

### Damage to Trees by Electric Wires.

It is a question whether the stringing of electric wires in cities and villages will not destroy a large proportion of the trees. Complaint is made in several cities that where the wires pass through the foliage the trees in nearly every instance have died, presumably from the effects of the electric current. It has been noticed also that the death of the trees almost invariably follows a season of rain, when the wet leaves are good conductors of electricity and carry it from the wires to the trees. In some cases the death of trees has been caused by wires supposed to be thoroughly insulated, the covering having been rubbed off the wires by the friction of the branches when moved by the wind. The evidence that the trees have been killed by electricity is furnished by the fact that in numberless instances the trees through which the wires pass died in an hour during a storm, while those standing a few feet from the wires were uninjured. These results will raise the question as to the liability of electric light companies for the damage caused by the killing of shade trees.

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## RECENTLY PATENTED INVENTIONS.

### Engineering.

STEAM GENERATOR AND TANK HEATER.—Thomas F. Butterfield, De Witt, Iowa. This is an improvement upon a former patented invention of the same inventor, and provides a portable heater in which the tank top is formed by a head plate or cap having an integral upward rim flange and a depending flange, and having air and fuel inlets, and a smoke outlet, there being a fire chamber or furnace secured to the depending flange of the cap. The heating chamber is sunk in the tank until the water rises above the top of the fire chamber and alongside the rim flange of the head, the entire heat from the chamber being utilized to heat the water in the tank.

### Railway Appliances.

CAR COUPLING.—John S. Williams, Krebs, Indian Territory. With this improvement meeting cars are coupled automatically either on a curve or straight line of railroad, the uncoupling being readily effected from the side of the car. In a hollow drawhead is a vertically slidable coupling pin, a coupling link being held projected by a forwardly spring-pressed slide bar, and supported on an apron hung from the drawhead by a swivel-connected arm adapted to incline and laterally adjust the projected end of the link.

CAR FENDER.—Peter Dunwald, Rio, N. Y. This improvement comprises revoluble brushes extending in V-shape in front of the car, and revolved from its running gear, by which a person in the path of a moving car will be swept to one side, or be received on falling in a netting at the rear of the brushes. The mechanism connecting the revoluble brushes with the car running gear may be moved into or out of operative connection by a lever fulcrumed on the car platform.

CAR COUPLING.—James N. Van Dorn and Charles G. Seaman, Spokane, Washington. In this coupling each drawhead is provided with a shoe and a dog arranged side by side, the shoe having an opening adapted to receive a hook on the dog of the opposing drawhead, the hooks of both dogs, as the cars come together, sliding over the noses of the opposing shoes and dropping into the openings, making a double connection. The coupling takes place automatically, and uncoupling may be effected without going between the cars. A car with this improvement may also be readily coupled with another having only the link and pin coupler.

### Electrical.

CANAL BOAT PROPULSION.—William Elmer, Jr., Trenton, N. J. Instead of running a motor on a suspended cable for canal boat haulage, this inventor provides means for moving a truck along the towpath, the electric motor being mounted on the truck and receiving energy from a trolley wire, and also carrying a rotating sheave around which a suspended traction rope is engaged, so that when the sheave is rotated by the motor the truck is moved along. The motor is easily operated, and the power required for its own propulsion is reduced to a minimum.

### Agricultural.

PLOW.—Herman Symmank and Ernst Matthijez, Giddings, Texas. This invention relates especially to an improved sweepstock, and is an improvement on a former patented invention of the same inventors, so improving the construction that the stock may be used with any form of share, as a sweep, a double plow for bursting middles, a single plow, a shovel, or a like implement. The sweepstock is also provided with a point integral with its shoe or footbar, and which will assist in holding the share in position.

DRAUGHT EQUALIZER.—Cornelius P. Houtsma, Sioux Center, Iowa. To evenly distribute the force of four horses drawing a grain harvester, mowing machine, or other agricultural implement, this inventor has devised an equalizer designed to correct the tendency to side draught where there are three horses on one side of the tongue and one horse on the other side. The invention also provides a simple means for the ready attachment of the equalizer without drilling holes in the frame bars of the harvester or other machine.

HAY PRESS.—Andrew C. Miller and Edward A. Johnson, Commerce, Mo. This is a press adapted to be continuously operated by a horse or other power, and comprises a frame having chambers to receive the hay, and having feeding and pressing plungers or pistons, a rotative shaft having arms, and a lever and connecting rod arranged to be engaged by the arms and connected to the pistons, so that when the shaft is rotated the arms will act on the lever and the connecting rod to move the pistons. The construction is very simple and inexpensive.

### Mechanical.

COMBINATION TOOL.—Willard Topliff, Youngs, N. Y. This invention combines the features of an ordinary try-square or the like, with a weather board gage, for use by carpenters either as a square or gage. The tool has a blade formed with a recess and a clip having two arms, one of which has a projection adapted to engage the recess, the arms being connected by a central portion extending beyond each side of the blade and capable of engaging one of its edges, to form a fulcrum on which the arms may be moved.

CLUTCH.—Ernest W. Carleton, Austin, Texas. A simple and economical clutch mechanism for transmitting power is provided by this invention, in which the clutch has independent rotatable disks that act on peripheral eccentric portions so arranged that the disk is held free from contact with the drive shaft and the entire bearing of the clutch mechanism is thrown on the grip members, the shaft apertures in the disks being made sufficiently large to overcome any irregularity of the bearing faces of the internal cam portions, and obviating the necessity of providing outside collars.

SAW.—Charles T. Redfield, Glen Haven, N. Y. This invention provides an improved frame for supporting the saw blade, the frame being trussed to furnish a tensile strain between the middle portion of the cross bar and the upper ends of the end bars of the frame, by which a drawing strain may be exerted between the cross bar and the upper portion of the end bars in such a manner as to prevent the cross bar from moving out laterally under the strain of tightening the saw blade.

STONE CUTTING MACHINE.—Peter H. Berrighin, Quincy, Mass. In this machine the pointers or chisels are designed to act automatically, simulating hand work, as are also the pene and bush hammers, in finishing the work. The devices carrying the chisels and pene and bush hammers are adjustable vertically to act on blocks of any desired thickness, and the stone while being cut rests on a truck which may be moved at a proper rate of speed or shifted sidewise to bring the block properly beneath the stone-cutting tools.

TIRE UPSETTING MACHINE.—Hans E. Olstad, Sioux Falls, South Dakota. To grip and hold the tire to be shrunk while the shrinking devices are being operated, without employing wedges, this machine is made with a frame having movable and fixed jaws to hold the tire, there being means for opening and closing the jaws and for moving them toward one another to effect the upsetting or shrinking. The part of the tire operated upon is substantially covered by the clamping devices, its bending being thus prevented and its shrinking insured.

CLEANING BOLTING SIEVES.—Daniel E. Burner and Maconius Shaner, Columbus, Ohio. In horizontal bolting sieves which have a gyrating motion, this invention provides a simple and inexpensive brush for cleaning the sieves. The body block of the brush comprises a number of radiating arms, and above the sieve are secured pins extending downward nearly to the bolting cloth. The brush is placed loosely on the sieve, whose gyrating movement causes the brush to bound back and forth between the frame and the pins, the pins directing the brush around the sieve.

OIL WELL JACK POST.—Charles V. Card, Mayburg, Pa. To enable the cap of the jack post to be conveniently removed at any time, or to facilitate its adjustment in case of wear, the cap bolts, passing through the cap and extending into recesses in the sides of the post, are formed with eyes which are engaged by a transverse bolt.

### Miscellaneous.

GAS BURNER FOR STOVES.—Peter Rohrbach, Brooklyn, N. Y. To convert an ordinary kitchen stove or range into a gas stove this inventor has devised a burner whose hollow base is adapted to be seated in the fire pot and connected by tubing with the gas supply, an upwardly extending burner tube having air inlet holes, while on this tube screws the burner head, consisting of a hollow cross piece terminating at each end in a hollow annular burner. These two annular burners are brought into the pot holes of the stove, and form a support for the various kitchen utensils.

WEATHER STRIP AND DOOR STOP.—Adolphus M. Doyle, Leoti, Kansas. A stop adapted for attachment to the door, according to this invention, is normally pressed downward by a spring, and a weather strip and pin are also pivotally connected with the door, the pin passing through the weather strip to engagement with the stop, and communicating the pressure from the spring controlling the stop to the weather strip. The device is inexpensive and readily applicable to a door, the stop and weather strip being operated together by means of the knob spindle.

UMBRELLA CANE.—Rufus Waples, Jr., New York City. This is an improvement on formerly patented inventions of the same inventor, providing an umbrella canopy which may be compactly folded and placed in a tubular cane, the cane forming a stick for the opened umbrella. The invention comprises a novel combination of cover, ribs and braces, with a guide sleeve secured at its inner end to the center of the cover and at its lower end with the inner ends of the stretcher, so that when the umbrella is open the sleeve will be crimped between the stretchers and the ribs.

RIB TIP HOLDER FOR UMBRELLAS OR PARASOLS.—Heyward Scudder, Northport, N. Y. This invention provides a superior clamp for removably holding the tips of umbrella ribs snugly against the stick, two semicircular clamp sections embracing the stick, each having a shank with a spring eye adapted to receive the terminals of a pin, and the eyes yielding to permit the movement of the sections on the pins and contracting to hold the sections at the desired adjustment.

FURNITURE BASE.—Jacob L. Stair, Altamont, Ill. This base has an outwardly movable section and a longitudinal guideway, the supported article pivotally engaging the base at its movable section and engaging the guideway of the fixed section, while the guideway has branches extending through the front of the base, permitting a complete revolution of the supported article. The improvement is especially designed for use with folding beds, bookcases, wardrobes, etc., permitting the swinging of such furniture near a wall without contacting with the wall.

SWIVEL COUPLING.—Brown Henley, Hillsville, Pa. This is an improvement on a former patented invention of the same inventor for a coupling particularly intended for use as a fifth wheel for vehicles, and also as a coupling for singletrees. The upper and lower parts, fitting together and rotating on each other, are connected by a clip which allows due rotary movement, and the clip has a bar that bears centrally on one of the parts and shanks which rigidly connect it with the other part.

PATTERN PRODUCING APPARATUS.—Felix Crakauer, Wiesbaden, Germany. This apparatus comprises a series of extensible outline strips having teeth or the like to produce an impression on the paper, while lazy tongs and adjusting devices are connected to the free ends of the strips to complete the outline of the pattern. The apparatus, adjusted according to the required measurements, automatically forms the outline of the pattern, and it may be transferred directly to the paper.

PENCIL.—Henry Hunt and Henry Hunt, Jr., Wilkesbarre, Pa. This pencil has a tubular body to receive a lead, there being an eraser held in one end of the body, while on its other end fits a removable cap or clamping sleeve adapted to firmly hold the lead in adjusted position. Within the clamping sleeve is a spring metal band carrying clamping jaws to hold the lead and sleeve in place, the end of the lead being moved at pleasure as required. The device is designed to be simpler, cheaper and more convenient than various other forms of pencil.

ARTIFICIAL LIMB.—Samuel M. Kellum, Altman, Col. According to this invention the limb is composed of an inner and an outer socket section, the outer section having free movement on the inner one, and the latter having means for binding it closely to the natural limb or stump. A supporting belt from the waist has independent connections with both the inner and the outer socket sections, and the artificial limb proper cannot irritate the skin.

BICYCLE AND TRICYCLE.—William F. Williams, London, England. To promote the chest development of riders and enable other muscles to cooperate with those of the legs in propelling a machine, and also to enable the machine to be steered by the shoulders, this inventor has devised a combined shoulder support and steering device, there being combined with the steering fork spindle abutments or supports to resist the forward pressure of the shoulders, the supports being carried by a rod adjustable on a spindle parallel to the steering head, and coupled thereto by lever arms and links.

PANORAMIC CAMERA.—Horatio G. Wood, Newport, R. I. In this camera the driving mechanism is greatly simplified, and the camera can be used for making either panoramic views or ordinary views. On the fixed pivot for the camera casing is a stationary gear wheel, there being a pinion in mesh with the gear wheel, and a winding roller carrying the pinion being adapted to wind up the film after the exposure is made.

FILTER.—Alexander H. Wright, Stratford, Canada. For filtering cane juice and other liquids in an economical and thorough manner, this invention provides a casing mounted on hollow trunnions to form the inlet and outlet for the liquid to be filtered, a perforated plate supported above the bottom of the casing forming a space from which leads the outlet, and there being a removable cover for the casing. The liquid flows through the filter under pressure, and the filtering material consists of bagasse, straw, or other fiber, or fine gravel.

GAS BURNER.—George H. Parsons, St. Louis, Mo. This burner has an inner wall with openings in its side, and an outer casing with registering openings, and may be adjusted to furnish a blue flame with an intense heat and no smoke, after the manner of a Bunsen burner, or be adjusted to furnish light for illuminating purposes. It is designed also to support a cup or receptacle for heating liquid or to receive a glass globe.

RIDING SADDLE.—William C. and Jesse D. Padgitt, Dallas, Texas. This saddle is an improvement on a former patented invention of one of the same inventors, and has a tree or frame formed of a short rigid fork and a flexible body or rear portion, including a seat and cantle of leather or other flexible material. The improvement provides for increasing the strength of the flexible portion without adding materially to its weight.

FENCE WIRE STAY.—Alfred J. Sloan, Clyde, N. Y. This stay is bent from a wire rod to be adapted to hook fast to the fence wires, hold them spaced, and have a locking device at each end of the stay which affords means for the detachable but secure connection of the ends of the stay with the upper and lower wires of the fence. The stay is light, strong, and inexpensive, and quickly attached or detached.

STOVE.—James P. Rasmusson and James Oliver, Tacoma, Washington. In sheet metal stoves for burning wood, this invention provides an air-tight casing so made that the damper is securely held to its seat irrespective of the expansion and contraction of the metal. The damper casing has a depressed front in which a disk turns on a bolt, a pivoted weighted arm engaging the bolt to cause it to press the disk upon its seat, thus establishing a very tight joint.

COUCH.—Richard V. W. Wicks, Brooklyn, N. Y. This couch admits of placing the body in a reclining, upright, or partially upright position, and requires but slight exertion of the occupant to assume any desired position, when the couch will be automatically locked in such position. The couch has a head rest or pillow which follows the position of the head section of the couch when raised or lowered. The couch has a mattress of spring-supported slats or woven wire arranged to readily break at the point where the head section rises at an angle to the intermediate section of the bed frame.

CLOTHES STICK.—William J. Coakley, Rockland, Me. This is a laundry implement adapted to conveniently move about and change the position of the clothes in the boiler, and to facilitate removing the clothes. The invention comprises a slightly yielding head piece on the end of a handle lever, the head piece consisting of a removable barrel shaped shell composed of a series of longitudinal ribs, the head yielding enough to avoid punching holes in the clothing, and being also capable of resisting the action of boiling water.

STRING FASTENER.—Charles C. Pine, New York City. This is a device for use on shoes, corsets, gloves, etc., enabling the wearer to securely fasten the end of the string in a very simple manner. The fastener is preferably made of a single piece of sheet metal, and has a pronged back plate by which it is secured to the article on which it is applied. The device comprises two opposing plates connected by a cross bar, a tongue being arranged between the plates and extending along the circumference of one of them to engage the end of the string.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.


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## Notes & Queries

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**Names and Address** must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

**References** to former articles or answers should give date of paper and page or number of question.

**Inquiries** not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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(6847) J. F. asks: Please send me a table or formulæ for working out the amount of power consumed in the circuit upon which is placed a Thomson recording watt meter, 2 wire, 100 volts, as I have a meter in my house and I want to learn how to figure out how much I burn. A. The general principles of electric light metering are based on the assumed maintenance of a constant voltage and the registering of amperes by the meter. Then, by multiplication of meter reading by the voltage of the system, the watts are given. Three to four watts are required per candle power and 746 per horse power. The customer who buys light cares nothing about watts. A slight drop in voltage, while almost unappreciably diminishing the amperes and watts and scarcely affecting his bill, may cut his candle power down very seriously. A correct electric meter should register voltage as well as amperage. If a reduction of amperage reduces the bill in direct ratio, the reduction of voltage should reduce it in a very high ratio, if used for light; not if used for power. A correct power meter is not necessarily a correct light supply meter.

(6848) F. G. U. says: Please give me in SCIENTIFIC AMERICAN formula for bath to temper steel such as mill picks and rock drills. A. If cast steel is made white hot, it is spoiled; yet if a person takes a chisel, mill pick, or other pointed tool to be repaired, the smith pushes it into the fire. The point is soon white hot. They will now push it in and out of the fire a few times, and at last bring it out red hot and work it. Of course it is already spoiled; and no matter how low it is tempered, it is next to useless. Take one to the smith, and see that he puts the body of the tool in the fire, leaving the two thin ends uncovered till the middle is red hot. As soon as the middle is red hot pull back, and let the thin end just get a dull red heat. It must now be hammered edgewise first and flatways last of all. It is best to hammer it on the flat part of the anvil, as drawing steel on the edge of the anvil, although a great deal quicker, makes it short in the grain, and always causes the tool to break in the thinnest place. Serve the other end the same, only repeat as soon as it loses its dull red color. The lighter the blows in working steel, the tougher it is. The point should be quite as thin as a fitter's chipping chisel, only a little longer, then it will not require doing up so often. When the ends are drawn out, the middle will have lost its red heat. The ends can now be filed a little. Now to temper them. Heat them in the flame of the fire, using great care. When a very dull red heat, cool in rain water, with the chill taken off, about ¾ inch from the end, and let down to a blue; if it should be too brittle, a little lower. Serve the other end the same. Cool all over. Grind the edge rather blunt, and for the first few blows hit as light as possible. The secret is in working it at as low heat as possible, only keep on repeating very often, and to hit it edgeways as little as possible, but flatways as much as you like.

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## NEW BOOKS AND PUBLICATIONS.

A PRACTICAL HANDBOOK ON THE CARE AND MANAGEMENT OF GAS ENGINES. By G. Lieckfeld, C.E. Authorized translation by G. Richmond, M.E. With instructions for running oil engines. New York: Spon & Chamberlain. London: E. & F. N. Spon. 1896. Pp. xiv, 103. Price $1.

The subject of this book, which is very concise, is really the running of an "Otto" gas engine and of a "Hornsby-Akroyd" oil engine. It is fair to say that one who has mastered these two engines will be in good condition to cope with any motor placed before him, as they are typical and standard machines. The "Testing Card" and "Treatment of Derangements" are samples of the headings. We note especially that the section on the oil engine is written by Mr. George Richmond, M.E., of the De la Vergne Company, an engineer of high standing, who has been identified with the development of oil engines in this country.

DR. JAMESON'S RAID: ITS CAUSES AND CONSEQUENCES By Rev. James King. New York and London: George Routledge & Sons. Pp. 180. Price, paper, 50 cents.

This is a concise handbook on the political situation in South Africa, supplying information respecting the Boers and their country, as well as treating of the Jameson raid. The story is told from the time of the first Dutch colonization, and the book also has an account of the diamond and gold fields of the Rand.

CHRISTIANITY AND OUR TIMES. By R. P. Brorup. Chicago: International Book Company. 1895. Pp. 228. Price 25 cents.

THE PSYCHOLOGY OF ATTENTION. By Th. Ribot. Authorized translation. (Third revised edition.) Chicago: The Open Court Publishing Company. 1896. Pp. viii, 120. Price 75 cents. Paper 25 cents.

OBSERVATIONS OF A BACHELOR. By Louis Lombard, author of "Observations of a Traveler," "Observations of a Musician," "Love's Sufferings," composer of the opera "Juliet," and founder and director Utica (N. Y.) Conservatory of Music and School of Languages. Utica, N. Y.: L. C. Childs & Son. Pp. 151. Price 50 cents.

Beginning May 24, the American Wheelman, whose name is symbolic of originality and enterprise, will begin the publication of a daily cycling paper in New York City. There are now more than one hundred thousand cyclists in the metropolitan district, so that there will undoubtedly be adequate support. The weekly edition will not be injured by the daily; in fact, it will be improved. It is evidently the intention of the publishers to conduct it upon a high plane, for the editor says: "It will be our aim to make the weekly American Wheelman a high class literary and technical journal, combining the characteristics of Harper's Weekly and the SCIENTIFIC AMERICAN." We wish our contemporary every success in their new venture.


### TO INVENTORS

An experience of nearly fifty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.


# INDEX OF INVENTIONS

**For which Letters Patent of the United States were Granted**

## May 5, 1896,

**AND EACH BEARING THAT DATE**

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Wheel. See bicycle or tricycle wheel. Self lubricating wheel. Trolley wheel.
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Wringer. Clothes Wringer.
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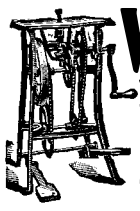

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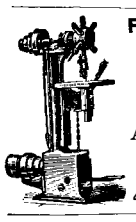

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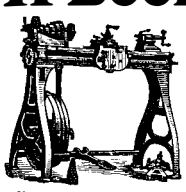

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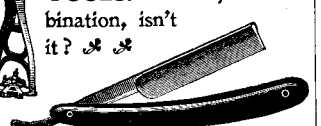

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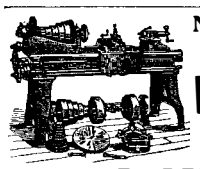

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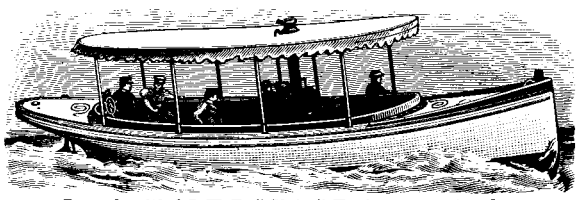

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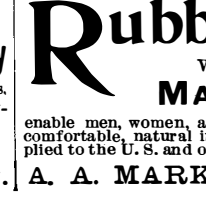

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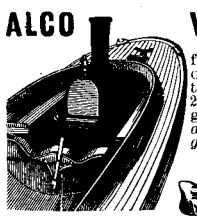

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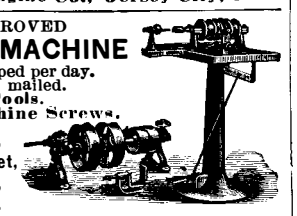

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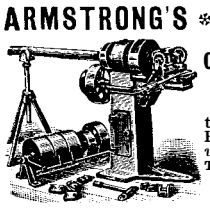

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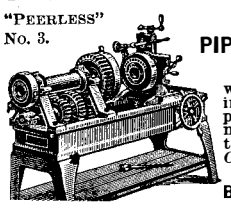

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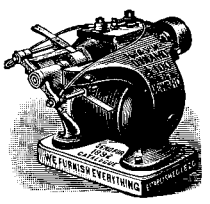

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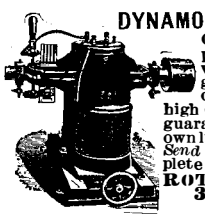

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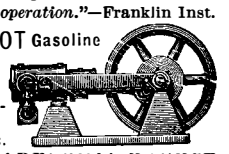

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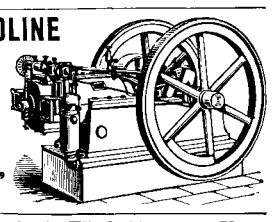

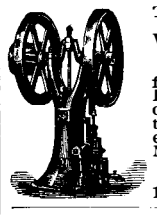

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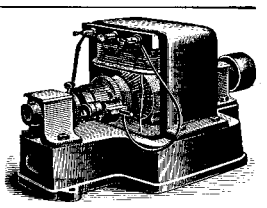

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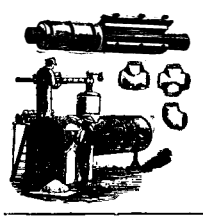

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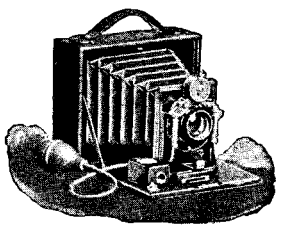

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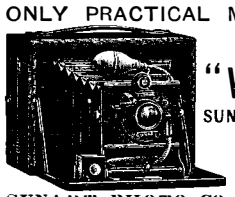

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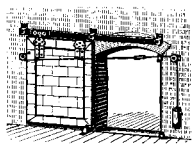

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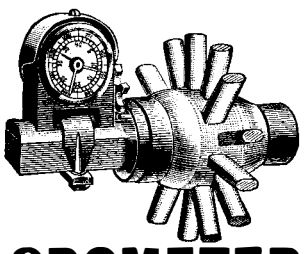

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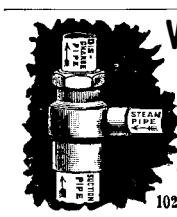


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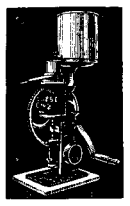

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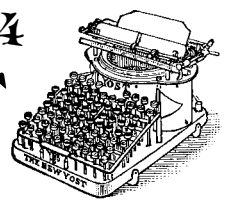

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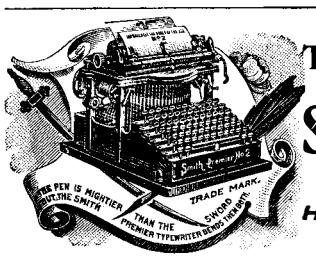


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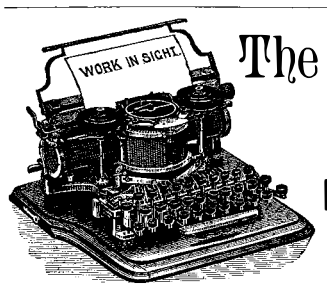


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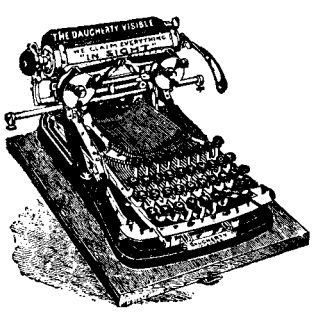

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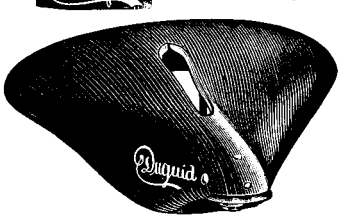


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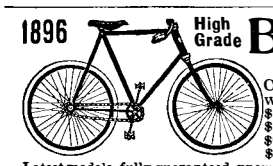

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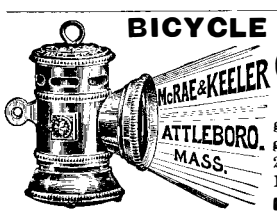


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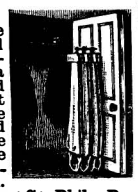

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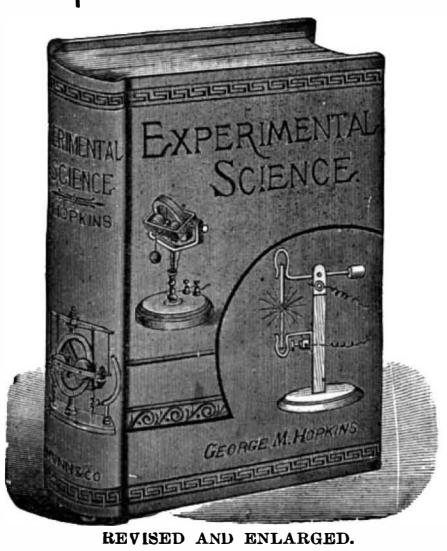


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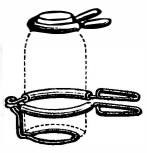

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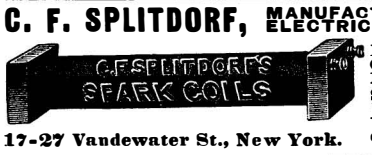


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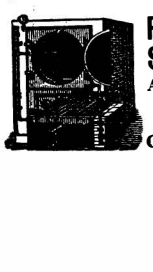

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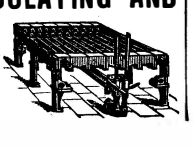

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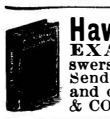

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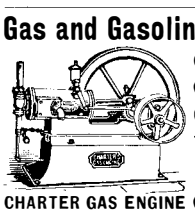
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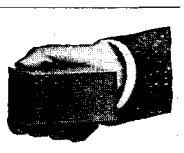
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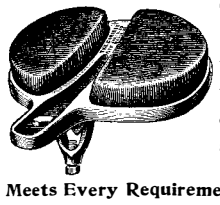
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